JOURNAL

OF THE

AMERICAN GEOGRAPHICAL SOCIETY

OF

NEW YORK

MDCCCLXXXIII

VOL. XV

NEW YORK
PRINTED FOR THE SOCIETY

AMERICAN GEOGRAPHICAL SOCIETY.

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CHARTER OF INCORPORATION.

GRANTED APRIL 13, 1854.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION 1. George Bancroft, Henry Grinnell, Francis L. Hawks, John C. Zimmerman, Archibald Russell, Joshua Leavitt, William C. H. Waddell, Ridley Watts, S. De Witt Bloodgood, M. Dudley Bean, Hiram Barney, Alexander J. Cotheal, Luther B. Wyman, John Jay, J. Calvin Smith, Henry V. Poor, Cambridge Livingston, Edmund Blunt, Alexander W. Bradford, and their associates, who are now or may become hereafter associated for the purposes of this act, are hereby constituted a body corporate by the name of "The American Geographical and Statistical Society," for the purpose of collecting and diffusing geographical and statistical information.

§ 2. For the purposes aforesaid, the said Society shall possess the general powers and privileges, and be subject to the general liabilities, contained in the third title of the eighteenth chapter of the first part of the Revised Statutes, so far as the same may be applicable, and may not have been modified or repealed; but the real and personal estate which the said Society shall be authorized to take, hold, and convey, over and above its library, and maps, charts, instruments, and collections, shall not at any time exceed an amount the clear yearly income of which shall be ten thousand dollars.

§ 3. The officers of said Society shall be a president, three vice-presidents, a corresponding secretary, a recording secretary, a librarian, and a treasurer and such other officers as may from time to time be provided for by the by-laws of the said Society.

§ 4. The said Society, for fixing the terms of admission of its members, for the government of the same, for changing and altering

the officers above named, and for the general regulation and management of its transactions and affairs, shall have power to form a code of by-laws, not inconsistent with the laws of this State, or of the United States, which code, when formed and adopted at a regular meeting, shall, until modified or rescinded, be equally binding as this act upon the said Society, its officers, and its members.

5. The Legislature may, at any time, alter or repeal this act.
6. This act to take effect immediately.

STATE OF NEW YORK, } *ss.:*
Secretary's Office, }

I have compared the preceding with the original law on file in this office, and hereby certify the same to be a correct transcript therefrom, and of the whole of said original law.

Given under my hand and seal of office, at the city of Albany, this
[L. S.] thirteenth day of April, one thousand eight hundred and fifty-four.

A. G. JOHNSON,
Deputy Secretary of State.

AMENDED CHARTER.

PASSED APRIL 8, 1871.

STATE OF NEW YORK, NO. 237, IN SENATE. *March* 7, 1871.—Introduced with unanimous consent, by Mr. Bradley; read twice, and referred to the Committee on Literature; reported favorably from said committee, and committed to the Committee of the Whole.

CHAP. 373.

AN ACT in relation to The American Geographical and Statistical Society.

PASSED April 8, 1871.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION 1. The name or corporate title of the said Society shall hereafter be The American Geographical Society of New York.

§ 2. The object of the said Society shall be the advancement of geographical science; the collection, classification and scientific arrangement of statistics, and their results; the encouragement of explorations for the more thorough knowledge of all parts of the North American continent, and of other parts of the world which may be imperfectly known; the collection and diffusion of geographical, statistical and scientific knowledge, by lectures, printed publications, or other means; the keeping up of a correspondence with scientific and learned societies in every part of the world, for the collection and diffusion of information, and the interchange of books, charts, maps, public reports, documents, and valuable publica-

tions; the permanent establishment in the city of New York of an institution in which shall be collected, classified, and arranged, geographical and scientific works, voyages, and travels, maps, charts, globes, instruments, documents, manuscripts, prints, engravings, or whatever else may be useful or necessary for supplying full, accurate, and reliable information in respect to every part of the globe, or explanatory of its geography, physical and descriptive; and its geological history, giving its climatology, its productions, animal, vegetable, and mineral; its exploration, navigation, and commerce; having especial reference to that kind of information which should be collected, preserved, and be at all times accessible for public uses in a great maritime and commercial city.

§ 3. The power given by the act hereby accorded to the said Society, to take, hold, convey, manage, and make use of its real and personal estate, shall be understood as authorizing said Society to take and hold by gift, grant, bequest, devise, subject to all provisions of law relative to devises and bequests by last will and testament, or purchase real estate to the value of three hundred thousand dollars, and to invest its income, or its personal estate generally, so as to produce a regular annual income sufficient for the accomplishment of the purposes set forth in the first section of this act; but said annual income shall not exceed twenty-five thousand dollars annually.

§ 4. The said Society shall make an annual report of its proceedings to the Legislature.

STATE OF NEW YORK, *Office of Secretary of State,* } ss.:

I have compared the preceding with the original law on file in this office, and do hereby certify that the same is a correct transcript therefrom, and of the whole of said original law.

Given under my hand and seal of office, at the city of Albany, this twenty-second day of May, in the year one thousand eight hundred and seventy-one.

[L. S.]

DIEDRICH WILLERS, JR.,
Deputy Secretary of State.

BY-LAWS.

CHAPTER I.

TITLE.

The title of the Society is, "The American Geographical Society."

CHAPTER II.

OBJECTS.

The objects of the Society are, "The collecting and diffusing of geographical and statistical information."

CHAPTER III.

MEMBERS.

1. The Society shall consist of Fellows, Honorary, Corresponding, and *ex-officio* members.

2. Honorary members shall be chosen on account of their distinction in the science of geography or statistics, and not more than twelve of them shall hereafter be elected in any one year.

3. Corresponding members shall be chosen from those who have aided the advancement of geography or statistics.

4. *Ex-officio* members shall be foreign diplomatic representatives and consuls resident in the United States; and United States diplomatic representatives and consuls in foreign countries.

4. Fellows and Corresponding and Honorary members shall be elected as follows: All nominations of candidates shall be openly made in writing at a meeting of the Society, or the Council, by a member thereof, and, together with the name of the member making them, entered on the minutes. The persons thus nominated, when

approved by the Council and elected by the Society, shall, on payment of the initiation fee, if nominated as Fellows, and without such payment if nominated as Corresponding or Honorary members, become members of the Society accordingly.

6. Persons entitled to become *ex-officio* members of the Society shall, on the recommendation of the Council, be, by the Society, constituted and declared to be such members.

7. The name of any member of the Society may, on the recommendation of the Council, and by a vote of two thirds of the members present at a stated meeting of the Society, be dropped from the roll of its members.

CHAPTER IV.

INITIATION FEE AND ANNUAL DUES.

1. The initiation fee, including the dues for the current year, shall be, for a Fellow, ten dollars, to be paid immediately on election.

2. The annual dues thereafter shall be, for a Fellow, ten dollars, to be paid in advance.

3. Any Fellow of the Society, not in arrears, may commute for life all dues for fellowship by the payment at one time, if a Fellow, of one hundred dollars.

4. The name of any Fellow of the Society neglecting for two successive years to pay his annual dues, or at any time wholly refusing to pay them, may by the Council be erased from the list of Fellows of the Society.

5. The fiscal year of the Society shall, for all purposes, be the calendar year—that is, commence on the first day of January, and end with the 31st day of December in each year.

CHAPTER V.

OFFICERS.

1. The officers of the Society shall be a president, three vice-presidents, a foreign corresponding secretary, a domestic corresponding secretary, a recording secretary, a treasurer, and fifteen councillors; and these, together, shall form the Council of the Society.

2. The officers and members of Council elected at the next

annual election (except the president and treasurer) shall, at their first meeting, divide themselves into three classes, each to embrace one vice-president, one secretary, and five members of the Council; one of which classes shall hold office one year, one for two years, and another for three years, to be determined at said meeting by lot or otherwise. The president and treasurer shall always be elected annually; and at each annual election thereafter there shall be elected a vice-president, a secretary, and five members of Council, each for the term of three years.

3. All officers of the Society to be chosen at any election may be voted for on one ballot.

CHAPTER VI.

ANNUAL MEETING.

1. The annual meeting of the Society shall be held on the second Tuesday after the first day of January in each and every year hereafter, when the annual election of the officers of the Society shall take place; and if, from any cause, there shall be a failure of the annual election at the time above designated for that purpose, the same may be held on the Tuesday next following—that is, on the third Tuesday after the first day of January in each year—and of which due notice shall be given.

2. Every member of the Society, who has been such for twenty days or more, and who is not in arrears for his dues for the past year, shall be entitled to vote at the said election.

3. At the annual meeting of the Society the Council shall present a general report of its proceedings and of those of the Society during the past year, and the secretaries and the treasurer shall also present their annual reports.

CHAPTER VII.

MONTHLY AND SPECIAL MEETINGS.

1. The Society, unless otherwise specially ordered by the Society or the Council, shall hold its stated meetings for the transaction of business on the second Tuesday of each month of the year, except July, August, and September.

2. The president, or, in his absence, one of the vice-presidents, may, and upon the written request of five members, shall, call a

special meeting of the Society by giving three days' notice thereof in two daily newspapers published in the city of New York.

CHAPTER VIII.

ORDER OF BUSINESS.

1. At all stated meetings of the Society for the transaction of ordinary business the order of proceedings shall be as follows :

1. Reading of the Minutes.
2. Reports and Communications from Officers of the Society.
3. Reports from the Council.
4. Reports from Committees.
5. Nominations of Members.
6. Special Orders.
7. Unfinished Business.
8. Miscellaneous Business.
9. Papers Read and Addresses Delivered before the Society.

2. All propositions presented for the action of the Society at any of its meetings shall be in writing, when requested by the presiding officer or any member. A proposition thus presented, when seconded and the question thereon stated from the chair, shall be deemed to be in the possession of the Society and open for discussion, but may be withdrawn by the mover at any time before amendment or decision.

3. No member shall speak more than once upon the same question until all the other members present desiring to speak shall have spoken, nor more than twice on any question without leave of the Society.

CHAPTER IX.

QUORUM.

At all meetings of the Society nine members present shall constitute a quorum for the transaction of business.

CHAPTER X.

COMMITTEES.

All committees authorized by the Society shall, unless otherwise specially ordered, consist of three members each, and be appointed by the presiding officer.

CHAPTER XI.

PRESIDING OFFICER.

At all meetings of the Society, on the arrival of the appointed hour and the presence of a quorum, the president, or in his absence one of the vice-presidents, or in the absence of both a chairman *pro tem.*, shall immediately take the chair, call the meeting to order, and preside. He shall have only a casting vote. He shall preserve order and decide all questions of order, subject to an appeal to the Society. He shall also, unless otherwise specially ordered, appoint all committees authorized by the Society ; and at every annual election, before the opening of the polls, he shall appoint two tellers of the election.

CHAPTER XII.

SECRETARIES.

1. Foreign Corresponding Secretary.—It shall be the duty of the foreign corresponding secretary to conduct the general correspondence of the Society with individuals and associate bodies in foreign countries.

2. Domestic Corresponding Secretary.—It shall be the duty of the domestic corresponding secretary to conduct the Society's general correspondence with individuals and associate bodies in the United States.

3. Both the foreign and domestic secretaries shall keep in suitable books to be provided for that purpose, at the Society's rooms, true copies of all letters written by them respectively on behalf of the Society ; and shall preserve, on proper files, at the said rooms, all letters received by them on the same account ; and at each stated meeting of the Society or the Council, they shall respectively report their correspondence, and read the same, or such parts thereof as may be required.

4. In case of vacancy in the office of either of the corresponding secretaries, or in the absence or disability of either of these officers, the duties of both may be performed by the other corresponding secretary.

5. The Society may designate a particular officer, or appoint a committee to prepare a letter or letters on any special occasion.

6. Recording Secretary.—It shall be the duty of the recording

secretary to give due notice of the time and place of all meetings of the Society, and to attend the same. He shall keep fair and accurate minutes of the proceedings of the Society, and record the same, when approved, in the Society's Journal. He shall give immediate notice to the several officers and committees of the Society, of all votes, orders, resolves, and proceedings of the Society affecting them or appertaining to their respective duties. He shall prepare a list of the members of the Society entitled to vote, to be handed to the tellers before the opening of the polls at each annual election. He shall officially sign and affix the corporate seal of the Society to all diplomas and other instruments or documents authorized by the Society or Council. He shall have charge of the corporate seal, charter, by-laws, records, and general archives of the Society, except so far as they may be expressly placed under the charge of others. He shall certify all acts and proceedings of the Society, and shall notify the Council of the death, resignation, or removal of any officer or member of the Society. He shall have charge of the rooms of the Society, and shall perform all such other and further duties as may from time to time be devolved upon him by the Society or the Council. He, together with the Council, shall have the charge and arrangement of the books, maps, and collections belonging to the Society. He shall cause to be kept in the rooms of the Society a registry of all donations to the library or collections of the Society, acknowledge their receipt by letter to the donors, and report the same in writing to the Society at its next stated meeting.

7. All documents relating to the Society and under the charge of the secretaries respectively, shall be placed in such depositories in the rooms of the Society as the Council may provide and designate for that purpose.

CHAPTER XIII.

TREASURER.

The Treasurer shall have charge of and safely keep all contracts, certificates of stock, securities, and muniments of title belonging to the Society. He shall collect the dues and keep the funds of the Society, and disburse the same under the direction of the Council; and so often as the said funds in the hands of the treasurer shall amount to one hundred dollars, he shall deposit the same, in the

name of the Society, in some incorporated bank in the city of New York, to be designated for that purpose by the Council; and the said funds, thus deposited, shall be drawn out of the said bank on the check of the treasurer, countersigned by the chairman of the Council, and only for the legitimate and authorized purposes of the Society. The treasurer shall, previous to the annual meeting of the Society, prepare and submit to the Council for audit, a detailed account of his receipts and disbursements for account of the Society during the past year; and which annual account, duly audited, he shall present, with his general report, to the Society at its annual meeting.

CHAPTER XIV.

COUNCIL.

1. The Council shall have the management and control of the affairs, property, and funds of the Society, and shall designate an incorporated bank in the city of New York, where the said funds shall, from time to time as they accrue, be deposited by the treasurer.

2. It may frame its own by-laws, not inconsistent with the charter or by-laws of the Society.

3. It shall appoint the necessary agents, clerks, and servants of the Society, with such powers and duties, privileges and compensation as it may from time to time determine; and may at pleasure revoke such appointments, and make others in their stead.

4. It shall have power to fill, for the unexpired term, any vacancy that may occur in any of the offices of the Society.

5. It shall have power, at its discretion, to declare vacant the seat of any member of its own body (except the president and vice-presidents) who shall have been absent from its meetings for three successive months; and also by a vote of a majority of the whole Council to remove from its own body any member thereof for cause; but in such case it shall be the duty of the Council to report every such vacancy or removal to the Society, at its next stated meeting thereafter, when such cases shall be subject to review by the Society.

6. It shall not, without an approving vote of the Society at a stated meeting thereof, make any contract whereby a liability in amount above one thousand dollars may be incurred by the Society; nor

without such vote make any sale or disposition of the property of the Society exceeding that sum in value.

7. The Council may, in its discretion, remit the initiation fee or annual dues of any member of the Society.

8. No member of the Council shall receive any salary or pecuniary compensation for his services.

9. The Council shall hold stated meetings for the transaction of business at least once in every month, except the months of July, August, and September.

10. At all meetings of the Council, five members present shall constitute a quorum for the transaction of business.

CHAPTER XV.

GENERAL PROVISION AS TO DEBT.

No debt on account of the Society, beyond the funds in the treasury for its payment, shall for any purpose, at any time, be incurred; and if at any time it shall appear that there are resting upon the Society pecuniary obligations beyond the funds in the treasury for their liquidation, no appropriation of funds from the treasury whatever, except for the necessary current expenses of the Society, shall be made, until the said pecuniary obligation shall be fully discharged, or the funds necessary for their extinction shall have been set apart for that purpose.

CHAPTER XVI.

ALTERATION OF THE BY-LAWS.

No alteration in the by-laws of the Society shall be made unless openly proposed at a stated meeting of the Society, entered on the minutes, with the name of the member proposing the same, and adopted by the Society at a subsequent meeting, by a vote of two thirds of the members present.

CHAPTER XVII.

ADOPTION OF THE BY-LAWS.

The foregoing are hereby adopted and declared to be the by-laws of the Society; and all by-laws of the Society heretofore adopted are hereby rescinded and declared to be null and void.

HONORARY AND CORRESPONDING MEMBERS AND FELLOWS.

HONORARY MEMBERS.

BAKER, Sir Samuel W., F.R.S., F.R.G.S.

CONSTANTINE, the Grand Duke, President of the Imperial Russian Geographical Society, St. Petersburg.

DUFFERIN, the Earl of, Ambassador of Great Britain at Constantinople.

ELDER, Sir Thomas, Adelaide, South Australia.

ISMAÏL, ex-Khedive of Egypt.

LAYARD, Sir Austen Henry, D.C.L.

MARKHAM, Clements R., K.C.B., Secretary of the Royal Geographical Society.

MCCLINTOCK, Admiral Sir Francis Leopold, LL.D.

MIDDENDORFF, Adolph Theodor von, Secretary of the Imperial Academy of Sciences, St. Petersburg.

NARES, Sir George S., R.N., K.C.B.

NORDENSKIÖLD, Professor A. E., Stockholm.

PEDRO II., Emperor of Brazil.

RAWLINSON, Major-General Sir Henry C., K.C.B., Vice-President of the Royal Geographical Society.

STRUVE, Professor Otto Wilhelm von, St. Petersburg.

WILCZEK, Count H., Vienna.

CORRESPONDING MEMBERS.

ABBE, Prof. Cleveland, Washington.

ALTAMIRANO, Ignacio, Mexico.

ALVORD, General Benjamin, U. S. A., Washington.

AMMEN, Rear-Admiral Daniel, U.S.N., Washington.

ARSENIEW, George, St. Petersburg.

ASBJORNSEN, P. C., Christiania, Norway.

BALFOUR, David M., Boston, Mass.

BARANDA, Joaquin, Mexico.

BARCLAY, James T., M.D., Jerusalem.

BARNARD, Henry, LL.D., Hartford, Conn.

BARTLETT, John Russell, Providence, R. I.

BASAROFF, Ed. Ivan de, Stuttgart.

BASTIAN, Dr. Adolph, Berlin.

BECKER, Prof. M. A., Vienna.

BEHM, Dr. E., Gotha.

BLACKIE, Walter G., Ph.D., F.R.G.S., Glasgow.

BOM RETIRO, Viscount, President of the Instituto Historico Geographico, Rio de Janeiro.
BOTASSI, Demetrius, Consul-General of Greece, New York.
BRAINE, Capt. D. L., U.S.N., Washington.
BREWER, Prof. Wm. H., New Haven, Conn.
BRIGHT, John, M.P., London.
BUSHNELL, Rev. Albert, Gaboon, Africa.
CHAIX, Prof. Paul, Geneva, Switzerland.
CHANDLES, W., F.R.G.S., London.
DANENHOWER, Lieut. J. W., U.S.N., Newport, R. I.
DO CANTO, Dr. Ernesto, St. Michael's, Azores.
DRAPER, Lyman, Madison, Wis.
FOULKE, Ensign G. C., Washington.
FRITSCH, Hugo O., New York.
GARDNER, Prof. James T., Albany.
GILMAN, Daniel C., LL.D., President Johns Hopkins University, Baltimore.
GUYOT, Prof. Arnold Henry, LL.D., Princeton, N. J.
HAGUE, J. D., New York.
HALDERMAN, John A., U. S. Minister to Siam.
HANCOCK, Prof. W. N., LL.D., Dublin.
HAYDEN, Prof. F. V., Washington.
HEATH, Dr. E. R., Wyandotte, Kansas.
HITCHCOCK, Prof. C. H., Ph.D., Hanover, N. H.
HOCHSTETTER, Dr. Ferdinand von, Vienna.
HOSMER, Dr. George, New York.
HOTCHKISS, Maj. Fred., Staunton, Va.
HOUGH, Franklin B., M.D., Washington
HUMPHREYS, Gen. A. A., U.S.A., Washington.
HUNT, Prof. T. Sterry, LL.D., Boston.
ISMAÏL Pacha, Governor-General of the Soudan.
JACKSON, John P., Berlin.
JOHNSTON, W. E., M.D., Paris.
LACROZE, Julius, C.E., Buenos-Ayres.
LAMANSKY, Eugene von, St. Petersburg.
LEFROY, Gen. Sir John Henry, B.A., London.
LESSEPS, Ferdinand de, Paris.
LONG, Col. C. Chaillé, Cairo.
LUCE, Capt. S. B., U. S. N., Newport, R. I.
MALTE-BRUN, V. A., Hon. Sec'y of the Société de Géographie, Paris.
MARISCAL, Ignacio, Mexico.
MARSH, Hon. G. P., LL.D., Rome.
MARTIN, Rev. W. A. P., President of the Imperial College, Pekin.
MATHEWS, F. A., U. S. Consul-General, Tangier, Morocco.
MAUNOIR, Charles, Paris.
MAURY, Louis Ferdinand Alfred, Paris.
MCCARTEE, D. Bethune, M.D., Summit, N. J.
MELLO, Dr. T. G. M., Rio de Janeiro.
MORGAN, Henry Jas., Ottawa, Canada.
NAPRSTEK, V., Prague, Bohemia.
NASSAU, Rev. R. H., Gaboon, Africa.
NEGRI, Cristoforo, Turin.
NEWMARCH, William, Hon. Sec'y of Statistical Society, London.
ORTIZ, Angel D., Seville.
PACKARD, Prof., A. S., Jr., Providence, R. I.
PASSMORE, Frank B., C.E., New Zealand.
PERALTA, Manuel M. de, London.
POESCHE, Theodore, Washington.
PORTO SEGURO, Viscount, Envoy of Brazil, Vienna.
PUMPELLY, Prof. R., Newport, R. I.
RAE, John, M.D., London.
RÀIMONDI, Antonio, Lima, Peru.
RAYMOND, Capt. Chas. W., U.S.A., West Point, N. Y.

RODGERS, Rear-Admiral John, U.S. N.
ROHLFS, Gerhard, M.D.
ROMERO, Matias, Envoy of Mexico, Washington.
ROTHROCK, J. T., M.D., Wilkesbarre, Pa.
SAPUCAHY, Viscount, Rio de Janeiro.
SCHLAGINTWEIT-SAKÜNLÜNSKI, Robert von, Giessen, Germany.
SCHUMACHER, Hermann A., M.D., Consul-General of Germany, New York.
SCHUMACHER, John, Altona, Germany.
SCHUYLER, Eugene, U. S. Minister to Roumania, Greece, and Servia.
SELFRIDGE, Comm. T. O., U.S.N., Washington.
SEYMOUR, Horatio, LL.D., Utica, N.Y.
STANLEY, Henry M., Africa.
STARRING, Gen. F. A., Paris.
STEERE, J. B., Hongkong.
STEVENS, Henry, LL.D., London.
STONE, Gen. Chas. P., Cairo.
TILLEY, Sir S., Ottawa, Canada
VAN CAMPEN, Sam'l Richard, F.R G.S., C.M.G.S.N., London.
VINCENT, Frank, Jr.
VIVIEN DE ST.-MARTIN, Versailles.
WALKER, Gen. Francis A., New Haven, Conn.
WALLING, H. F., C.E., Washington.
WHEELER, Capt. Geo. M., U.S.A., Washington.
WILLIAMS, S. Wells, LL.D., New Haven, Conn.
WRIGHT, Gen. Horatio G., U.S.A., Washington.
WYMAN, Capt. R. H., U.S.N., Washington.
WYSE, Lieut.-Comm. Lucien N. B., Paris.
YOUNG, Jess., F.R.G.S., Wisbeach, England.

FELLOWS.

CORRECTED TO DECEMBER 31, 1883.

Date of Election.	
1859	Arnoux, William H.
1859	Arnold, David H. (L. F.)
1859	Aymar, William. (L. F.)
1860	Acton, Thomas C.
1869	Auchmuty, Richard Tylden.
1871	Atterbury, Rev. Wm. W., D.D.
1872	Allen, Horatio M.
1873	Albert, Halpern.
1874	Alexander, Junius B.
1874	Arthur, Gen. Chester A.
1874	Aufermann, August.
1874	Auchincloss, Henry B.
1874	Acker, David D.
1874	Avery, Samuel P.
1874	Agnew, John T. (L. F.)
1874	Arnold, Richard.
1874	Allen, Henry Wilder.
1874	Amy, Henry.
1874	Agnew, Alexander McL.
1874	Astor, W. W. (L. F.)
1874	Appleton, D. S.
1874	Anderson, Henry H.
1875	Amsinck, Gustav.
1876	Appleton, Nathan.
1878	Austin, Chas. P.
1879	Austin, William.
1879	Agostini, Joseph.
1879	Agnew, Cornelius R., M.D.
1879	Ashley, Lucien S.
1879	Astor, John Jacob. (L. F.)
1880	Anthony, James L.
1881	Andrews, John R.

1881 Abbett, Leon.
1881 Allen, Eben S.
1881 Armour, Herman O. (L. F.)
1881 Andrews, Henry C.
1882 Adams, Hugh W.
1883 Ames, Adelbert.
1883 Abbot, Abiel.
1883 Aub, Albert.
1883 Allen, Harry.
1883 Atterbury, J. T.
1883 Adams, Coe.
1883 Aikman, Walter M.
1883 Adams, William.

1852 Bancroft, George. (L. F.)
1852 Barney, Hiram. (L. F.)
1853 Brown, James M.
1853 Butler, Charles.
1856 Baker, Francis. (L. F.)
1856 Brevoort, J. Carson.
1859 Brown, James. (L. F.)
1859 Boorman, J. Marcus. (L. F.)
1859 Bernheimer, Isaac.
1859 Belmont, August. (L. F.)
1859 Barlow, S. L. M.
1861 Butterfield, Gen. Daniel.
1865 Banvard, John. (L. F.)
1868 Banks, David.
1868 Beckwith, N. M.
1868 Bennett, James Gordon.
1868 Bernheimer, Adolph.
1868 Bernheimer, Simon.
1868 Brady, John R.
1869 Bailey, Jas. Mühlenberg. (L. F.)
1869 Banyer, Goldsboro.
1869 Bickmore, Prof. A. S.
1869 Bierstadt, Albert.
1870 Butler, Cyrus.
1870 Botta, Prof. Vincenzo.
1870 Body, John E.
1870 Bishop, T. Alston. (L. F.)
1872 Brown, Walston H.
1873 Bailey, N. P.
1874 Bishop, D. W. (L. F.)
1874 Bien, Julius.
1874 Bartlett, Willard.
1874 Bissinger, Philip.
1874 Backus, Henry C.
1874 Ballin, Eugene S.
1874 Baldwin, Townsend B.
1874 Bates, Levi M.
1874 Barnes, John S.
1874 Barbour, Thomas. (L. F.)
1874 Bonner, Robert.
1874 Bonn, William B.
1874 Barnard, Horace.
1874 Barnard, F. A. P., LL.D.
1874 Benjamin, John.
1874 Butler, William Allen.
1874 Bartow, Morey H.
1874 Barr, William.
1874 Belding, Milo M.
1874 Buckley, Rev. Jas. M.
1874 Bookstaver, Henry W.
1874 Brownson, Lieut. W. H., U.S.N.
1875 Barney, Charles T.
1875 Beaman, Charles C., Jr.
1875 Bernheimer, J. A.
1875 Beckwith, Leonard F.
1875 Benjamin, E. B.
1875 Beekman, Gerard.
1875 Babcock, Gen. O. E., U.S. Army.
1875 Brownell, Silas B.
1875 Brown, Vernon H.
1875 Barnes, William.
1875 Beste, Henry.
1875 Bredt, Ernest.
1875 Bedle, Joseph D.
1875 Belknap, Capt. Geo. E., U.S.N.
1875 Bowie, Augustus J., Jr.
1876 Baldwin, Commodore Charles H., U.S.N.
1876 Brower, John.
1876 Billings, Frederick.
1876 Bellew, F. H. T.
1877 Booth, George.
1877 Bixby, Robert F.
1877 Börs, Christian.
1877 Briggs, Prof. Charles A.
1877 Blanchard, George R.

1877 Blatchford, Eliphalet W.
1878 Bliss, Cornelius N.
1878 Brown, G. Melville.
1878 Barton, Oliver Grant. (L. F.)
1878 Brown, Rev. Philip A. H.
1878 Brand, James.
1878 Brown, J. Romaine.
1879 Brady, James T.
1879 Barattoni, C. A.
1879 Bowen, Gen. Edmund S.
1880 Bayard, Edward, M.D.
1880 Beach, Miles.
1880 Bamberger, A. E.
1880 Banks, D. S.
1881 Baldwin, Edwin.
1881 Babcock, Courtland G.
1881 Bartlett, Commander John R., U.S.N.
1881 Barber, Charles G.
1881 Brown, Augustus L.
1881 Baldwin, Christopher C.
1881 Babcock, Samuel D.
1881 Ballin, Frederick E.
1881 Backus, Henry Landon.
1882 Bamberger, Jacob F.
1882 Belton, Frank S.
1882 Brown, George H.
1882 Baldwin, Octavius D.
1882 Ballin, Gustave N.
1882 Bacon, Francis M.
1882 Babcock, George N.
1882 Barger, Samuel F.
1882 Barney, Newcomb C.
1882 Bowen, Francis C.
1882 Barclay, J. Searle.
1882 Byers, John.
1883 Brown, Francis C.
1883 Brewster, Benj. (L. F.)
1883 Barber, Herbert.
1883 Bachem, C. H.
1883 Bound, Walter.
1883 Baker, Cyrus O.
1883 Beekman, Wm. B.
1883 Berry, Oliver F.
1883 Bishop, W. E.
1883 Bowne, Walter.
1883 Banta, Theodore M.
1883 Bangs, Charles W.
1883 Barr, Edward.
1883 Berger, Trenio G.
1883 Beach, Burton T.
1883 Battell, Robbins.
1883 Bennet, Ludovic.
1883 Benedict, Robert D.
1883 Blake, Frederick D.
1883 Bell, Capt. Wm. R.
1883 Blackford, Eugene G.
1883 Banker, George W.
1883 Benson, Frank Sherman.
1883 Bowles, George.

1852 Colton, Joseph H. (L. F.)
1855 Conkling, Frederick A. (L. F.).
1856 Cooper, Edward.
1856 Crooks, Ramsay. (L. F.)
1868 Catlin, N. W. Stuyvesant. (L. F.)
1868 Cisco, John J.
1868 Chapman, Joseph H.
1869 Cullum, Gen. George W., U.S. Army. (L. F.)
1870 Conklin, William A.
1872 Corse, Israel.
1872 Conklin, Eugene E.
1872 Crawford, Gen. S. W., U.S. Army.
1872 Clark, E. V.
1872 Cox, Samuel S.
1873 Coster, Charles H.
1874 Cruickshank, James, LL.D.
1874 Connery, T. B.
1874 Cowdrey, N. A.
1874 Curphey, James.
1874 Campbell, Allan.
1874 Church, Col. George E.
1874 Christern, F. W.
1874 Cockcroft, Jacob H. V.
1874 Chickering, Charles F.
1874 Comstock, Cornelius
1874 Constable, James M.
1874 Ceballos, J. M.

1874 Carter, Walter S.
1874 Caswell, Wm. H.
1874 Crerar, John.
1874 Crocker, David.
1874 Cruikshank, Edwin A.
1874 Crosby, J. Schuyler.
1874 Cochrane, Capt. Henry Clay, U.S.M.C.
1874 Colgate, James B.
1874 Constantine, Andrew J.
1874 Corning, Erastus.
1874 Cottenet, Francis.
1874 Cossitt, Frederick H.
1874 Coutan, Charles E.
1874 Conyngham, Wm. L.
1874 Crosby, Hiram B.
1874 Crocker, Geo. A.
1874 Crocker, Wm. Baylies.
1874 Chickering, George H.
1874 Carter, Oliver S.
1874 Catlin, Julius, Jr.
1874 Colgate, Robert.
1874 Curren, Robert.
1875 Clendenin, J. W.
1875 Cameron, R. W.
1875 Cushman, W. F.
1875 Cooper, George C.
1875 Champlin, John D., Jr.
1875 Cassebeer, Henry A., Jr.
1875 Chittenden, S. B., Jr.
1876 Clarke, W. H.
1876 Cullum, Mrs. George W. (L. F.),
1876 Cornell, John B.
1876 Curtis, Benj. L.
1876 Curtis, Benjamin R.
1879 Cooper, James G.
1879 Church, Simeon E.
1879 Coddington, Gilbert S.
1879 Caldwell, R. A., M.D.
1879 Childs, George W.
1880 Calvin, Delano C.
1880 Clark, Lester W.
1880 Chamberlain, J. A.
1880 Cohen, Maurice S.
1880 Collins, John C.
1880 Cormack, John A.
1880 Caverley, William.
1880 Camp, W. A.
1880 Cronly, John E.
1881 Chaffee, Jerome B.
1881 Carnochan, J. M., M.D.
1881 Canfield, Charles B.
1881 Clinton, Henry L.
1881 Chandler, Nathan.
1881 Coddington, Thomas B.
1882 Cooper, Wm. B.
1882 Calhoun, William.
1882 Clarkson, Banger.
1882 Campbell, Franklin W.
1882 Coudert, F. R.
1882 Conkling, Rev. N. W.
1882 Chapin, Wm. Viall.
1882 Cass, Gen. George W.
1882 Carolin, William V.
1883 Clarke, Thos. C.
1883 Cook, Martin R.
1883 Conklin, Enoch.
1883 Chapman, Henry E. (L. F.)
1883 Colbron, W. T.
1883 Chase, H. D.
1883 Clyde, W. P.
1883 Clews, Henry.
1883 Coit, George M.
1883 Candler, Henry B.

1855 Daly, Chief-Justice C. P. (L. F.)
1855 Dunshee, Prof. Henry W.
1856 Douglas, Andrew E.
1856 Dodge, Wm. E., Jr.
1856 Detmold, Wm., M.D.
1859 Dickerson, E. N.
1864 Detmold, Christian E.
1866 Darling, Wm. A.
1868 Dwight, Prof. Theo. W.
1868 Du Chaillu, Paul B.
1868 Dennis, Charles. (L. F.)
1870 Dash, John B.
1870 Davies, Alexander J. (L. F.)
1870 Drowne, Henry T.
1870 Dinsmore, William B.

1871 Daly, Joseph F.
1873 Delano, Franklin H.
1873 DePeyster, Gen. J. Watts. (L. F.)
1874 Diefendorf, Menzo.
1874 Davis, Noah.
1874 Dillon, Romaine. (L. F.)
1874 Dutilh, E.
1874 Decker, Charles A.
1874 Delafield, M. L.
1874 Dana, Charles A.
1874 Draper, Frank E.
1874 Devlin, Jeremiah.
1874 Decker, John J.
1874 Del Monte, Leonardo.
1874 Du Bois, Wm. A.
1874 De Castro, Diego.
1874 Davis, John G.
1874 Dalrymple, Alexander.
1874 Dunscombe, Richard T.
1874 Dun, R. G.
1874 Defendorf, Wilson.
1875 Darrow, William.
1875 Davies, Julien T.
1875 Du Bois, Eugene.
1875 Daniel, Edwin M.
1875 Davidson, Charles A.
1875 De Peyster, Frederic J. (L. F.)
1875 Dommerick, L. F.
1876 Drexel, Joseph W.
1877 Day, Henry M.
1877 Davis, Joseph Beale. (L. F.)
1878 Dana, Charles.
1878 Di Cesnola, Gen. L. B.
1879 Dahlgren, Charles B.
1879 Dodge, George E.
1879 Dana, Samuel B.
1880 Davis, Theodore M.
1880 Deane, John H. (L. F.)
1880 Dyckman, Isaac M.
1880 Du Bois, James G.
1880 Du Bois, Frederick N.
1880 Dash, Bowie.
1880 Dunn, John.
1880 Dexter, Henry. (L. F.)
1880 Deen, William M.
1881 Dean, F. M.
1881 Davies, H. B.
1881 Docharty, Augustus T. (L. F.)
1881 Dowd, William.
1882 Dunham, George H.
1882 Dunlap, Robert. (L. F.)
1882 Deems, Rev. C. F.
1882 Dodge, Richard H.
1882 Dunbar, James M.
1883 Demorest, W. J.
1883 Donnell, E. J.
1883 Decker, Jas. S.
1883 Dickson, Thos.

1859 Evarts, William M.
1864 Evans, Walton W.
1868 Emmet, Thomas Addis, M.D.
1874 Eaton, Dorman B.
1874 Eaton, D. Cady.
1874 Ewen, John, Jr.
1875 Esterbrook, Richard, Jr.
1875 Ellis, John W.
1875 Elliott, John.
1875 Eimer, Charles.
1875 Ely, Richard S.
1875 Eads, Captain James B., C.E.
1877 Elderkin, John.
1878 Eno, John C.
1878 Ellis, John, M.D.
1878 Edson, Franklin.
1879 Earl, Ferdinand P.
1879 Elliott, Samuel.
1880 Eckert, Thomas T.
1881 Ellis, Ralph N.
1881 Evans, Silas C.
1882 Easton, Nelson S.
1882 Edmonds, Walter D.
1882 Ellis, William Dixon.
1882 Eddy, Ulysses D.
1882 Earl, Abraham L.
1882 Edinger, August H.
1882 Edwards, J. Pierrepont.
1882 Emerson, J. W.
1882 Emmons, John.
1882 Earle, Joseph P.

1883 Eno, Amos F.
1883 Eyre, Maynard C.
1883 Earl, Wm. M.
1883 Emanuel, J. M.

1854 Field, Cyrus W. (L. F.)
1856 Field, David Dudley.
1856 Field, B. H. (L. F.)
1857 Fish, Hamilton.
1859 Fogg, Wm. H. (L. F.)
1860 Field, Rev. H. M.
1864 Faile, Thomas H.
1868 Frohwein, Theobald.
1869 Forsyth, Rev. John.
1871 Fliess, Wm. M.
1873 Freedman, John J.
1873 Fithian, Freeman J.
1874 Farragut, Loyall.
1874 Foshay, James W.
1874 Fabbri, Egisto P.
1874 Fellows, John P.
1874 Francklyn, C. G.
1874 Fleet, Oliver S.
1874 Forman, Alexander.
1874 Fox, Baldwin N.
1874 Fougera, Edmund C.
1874 Fox, Austen G.
1875 Foulke, Thomas.
1875 Faile, Charles V.
1875 Fargo, James C.
1875 Fuller, Charles D.
1875 Ford, James B.
1875 Foote, Emerson.
1875 Folsom, George W.
1876 Fisk, Gen. Clinton B.
1877 Fiske, Andrew.
1877 Flagg, William J.
1878 Ferris, L. Murray, Jr.
1879 Fellows, John R.
1879 Ferris, Robert M.
1880 French, Stephen B.
1880 Fairchild, George M., Jr.
1881 Fleitmann, Ewald.
1881 Fairbanks, Joseph H.
1881 Farrington, E. A.
1881 Fearing, Charles F.
1881 Foote, Frederick W.
1881 Fearing, William H.
1882 Fairbanks, Leland.
1882 Fellows, Charles H.
1882 Falls, Thomas J.
1883 Fish, James D.
1883 Fisher, Eustace W.

1856 Greenwood, Isaac J.
1857 Greene, John W., M.D. (L. F.)
1859 Griswold, George. (L. F.)
1868 Gebhard, Wm. H. (L. F.)
1868 Gerry, Elbridge T. (L. F.)
1868 Green, Andrew H.
1868 Greene, Gen. G. S.
1869 Gilbert, Clinton.
1872 Gerard, James W.
1872 Grinnel, R. M. (L. F.)
1873 Gillmore, Gen. Q. A., U.S.A.
1873 Gedney, Frederick G.
1873 Glaubensklee, Theo. G.
1874 Gardner, Hugh.
1874 Green, John. (L. F.)
1874 Gunther, William Henry.
1874 Gunther, F. F.
1874 Gibert, Fred. E.
1874 Gibbs, Theodore K.
1874 Gottsberger, William S.
1874 Galpen, Horace.
1875 Greene, Lieut. F. V., U.S.A.
1875 Gordon, Robert.
1875 Greene, G. S., Jr., C.E.
1875 Garrison, Cornelius K.
1875 Gibson, James.
1875 Goepp, Charles.
1876 Gautier, Dudley G.
1877 Gaylord, Augustus.
1877 Guleke, H. F., M.D.
1878 Gillies, James W.
1879 Graves, Arthur B.
1879 Gay, Joseph E.
1880 Graeff, Albert I.
1880 Gorringe, Lt. Comdr. Henry H., U.S.N.

1880 Gunning, William J.
1881 Gallaway, R. M.
1881 Gomez, A.
1881 Green, George. (L. F.)
1881 Giles, John C.
1881 Grace, William R. (L.F.)
1881 Garland, James A.
1881 Gallatin, James.
1882 Gillespie, Col. G. L.
1882 Gallaher, S. C.
1882 Gilbert, William E.
1882 Gallup, Albert.
1882 Gardiner, J. Graham.
1882 Gade, Frederick W.
1882 Garretson, Frederick P.
1883 Greenough, John. (L. F.)
1883 Granniss, James E.
1883 Gottschalk, Felix.
1883 Goodridge, John C., Jr.

1856 Hewitt, Abram S.
1856 Hunt, Wilson G.
1859 Henderson, John C.
1859 Havemeyer, John C. (L. F.)
1864 Hammond, Henry B.
1868 Huntington, Daniel. (L. F.)
1868 Hurlbert, William H.
1868 Hoguet, Robert J.
1868 Hall, Elial F.
1868 Hadden, John A. (L. F.)
1868 Hallock, Mrs. Frances.
1870 Hawkes, Prof. W. Wright.
1870 Havens, Charles G.
1870 Harrison, Prof. Thomas F.
1871 Hamilton, Alexander, Jr.
1871 Hand, Clifford A.
1872 Hammersley, John W. (L. F.)
1872 Hawkins, Dexter A.
1872 Holbrook, Levi.
1873 Havemeyer, Theo. A.
1874 Hancock, Gen. Winfield S., U.S.A.
1874 Hay, John.
1874 Hitchcock, Rev. Roswell D., D.D.
1874 Havemeyer, Hector C.
1874 Hoguet, Henry L.
1874 Hoyt, Oliver.
1874 Hurlbert, Henry A. (L. F.)
1874 Hutton, Benjamin H.
1874 Haydock, George G.
1874 Haines, John P.
1874 Hinton, John H., M.D. (L. F.)
1874 Hendricks, M. M.
1874 Havemeyer, James.
1874 Holbrook, E. F.
1874 Hoe, Richard M.
1874 Harper, Nathan.
1874 Hunter, Charles F.
1874 Hendricks, Edmund.
1874 Hendricks, Joshua.
1874 Hatch, Rufus.
1874 Huntington, C. P. (L. F.)
1874 Hunter, Lieut. Edward, U.S.A.
1874 Hoyt, Harlow M.
1875 Hubbard, Prof..O. P.
1875 Hammond, Wm. A., M.D.
1875 Houston, Col. D. C., U.S.A.
1875 Hoadley, John C.
1875 Hughes, Wm. H. T.
1875 Hoppenstedt, G. L.
1875 Hanemann, John F.
1875 Howland, Meredith.
1875 Hyde, Henry B.
1875 Harper, P. J. A.
1875 Hazen, Gen. W. B., U.S.A.
1875 Harris, Siegmund.
1875 Hun, Leonard G.
1876 Heminway, Albert G.
1876 Holt, Henry.
1876 Halsted, Major Geo. B.
1876 Holman, Frank E.
1876 Hoes, Wm. M.
1876 Hatfield, J. B. T.
1877 Houghton, Prof. Walter R.
1878 Howe, George S.
1878 Hermann, Henry. (L. F.)
1878 Hinman, Wm. K.
1878 Holden, Horace.
1878 Hitchcock, Hiram.
1879 Hamilton, William G.

1879 Harris, Col. Robert.
1879 Hayes, A. A., Jr.
1879 Hamilton, Capt. F. B., U.S.A.
1880 Hall, Hayden H.
1880 Howard, William Lee.
1880 Hickox, Charles R.
1881 Hinman, Russell.
1881 Henderson, Thomas, Jr.
1881 Hunt, Rev. M. A., O.M.I.
1881 Hoffman, Charles B.
1881 Hamilton, Robert Ray.
1881 Haven, George Griswold.
1882 Holme, Leicester P.
1882 Hascall, Theodore F.
1882 Hamilton, Dr. J. B.
1882 Higginson, James J.
1882 Hawk, William S.
1882 Hoag, Dr. W. E.
1883 Houston, Theodore.
1883 Hotchkiss, Horace L.
1883 Henry, Charles J.
1883 Hebert, Henry B.
1883 Howell, George R.
1883 Hyde, E. Francis.
1883 Hurry, Edmund Abdy. (L. F.)
1883 Hoyt, Alfred M. (L. F.)
1883 Hoyt, Wm. B.
1883 Hendricks, Arthur, T.

1859 Ireland, John B.
1874 Ives, Fred'k E.
1874 Iselin, Adrian, Jr.
1879 Inman, William H.
1879 Isham, Charles H.
1881 Ives, Brayton. (L. F.)
1882 Ijams, J. T.
1882 Imbrie, H. T.
1883 Ives, James M.

1852 Jay, John. (L. F.)
1852 Jones, John D. (L. F.)
1868 Johnson, Hezron A.
1871 Jones, Walter R. T.
1874 Judson, Wm. D.
1874 Janssen, Gerhard.
1874 Jesup, M. K. (L. F.)
1874 Jaffray, Edward S.
1874 Jenkins, Wm. L.
1874 James, D. Willis.
1874 Jameson, Joseph A.
1874 Jordan, Conrad N.
1874 Jones, George.
1874 Jaffray, Robert.
1878 Jones, George H.
1878 Judson, Capt. J. A., C.E.
1879 Jay, William.
1880 Jones, Frederick W.
1880 Jewett, George L.
1880 Jenkins, Silvanus F.
1881 Jewett, Hugh J.
1881 Johnson, Bradish, Jr.
1882 Jasper, John.
1882 Jenkins, Henry W.
1883 Judson, A. N.
1883 Jacobs, Abraham L.,
1883 Jager, A. Bernard.

1854 Kennedy, Robert Lenox.
1869 Kelly, Eugene.
1870 Kühne, Frederick.
1872 Kendrick, Col. H. L., U.S.A.
1873 Kennan, George.
1874 King, Edward.
1874 Kearney, Joseph R.
1874 Kunhardt, Henry R.
1874 Kingsland, Wm. M. (L. F.)
1874 Kidder, Henry P. (L. F.)
1874 Kalbfleisch, Charles H.
1874 Keck, Thomas.
1874 Knower, John.
1874 King, David, Jr.
1875 Knapp, Herman, M.D.
1876 Knauth, Percival.
1877 King, Clarence.
1878 Kernochan, Jas. Lorillard. (L. F.)
1879 Kane, S. Nicholson.
1880 Kidder, A. S., M.D.
1880 Keene, James R. (L. F.)
1881 Kennedy, John S. (L. F.)

1881 Kane, Grenville. (L. F.)
1881 Kirsch, Louis.
1882 King, Le Roy.
1882 King, George Gordon.
1882 King, John S.
1882 King, Vincent C. (L. F.)
1883 Kneeland, Henry T.
1883 Klutschalk, Henry W.
1883 Knapp, S. P.
1883 Kohn, Julius A.
1883 Kerr, Walter.

1852 Livingston, Cambridge. (L. F.)
1857 Low, A. A.
1859 Lathers, Richard. (L. F.)
1868 Lawrence, Abraham R.
1869 Lawrence, John S. (L. F.)
1870 Loew, Frederick W.
1870 Lyman, Edward H. R.
1871 Letson, Robert S.
1871 Larremore, Richard L.
1871 Lee, Ambrose.
1872 Libby, William. (L. F.)
1874 Lauterbach, Edward.
1874 Livingston, Robert J. (L. F.)
1874 Langdon, Walter. (L. F.)
1874 Lorillard, Peter.
1874 Lorillard, George L.
1874 Livingston, John A.
1874 Livingston, Robert E.
1874 Littlejohn, James.
1874 Lawton, Walter E.
1874 Lawrence, Jos. B.
1874 Legget, Francis W.
1874 Le Comte, Joseph.
1874 Lewis, Walter H.
1874 Lawson, Leonidas M.
1874 Lane, George W.
1874 Lawrence, Samuel B.
1874 Lesher, Stephen R.
1875 Low, Seth.
1875 Lawrence, George N.
1876 Low, A. Augustus.
1876 Lindau, Leopold.
1877 Lockwood, Le Grand.
1877 Latrobe, John H. B.
1878 Loubat, J. F., LL.D. (L. F.)
1878 Leon, Nestor Ponce de.
1879 Levy, Augustus H.
1880 Lang, Alexander.
1880 Learned, Edward.
1880 Lee, William H.
1881 Libbey, William, Jr. (L. F.)
1881 Langdon, Woodbury G. (L. F.)
1881 Little, Joseph J.
1881 Livermore, Edwin R.
1881 Lee, J. Bowers.
1882 Lambert, Edward.
1882 Langdon, Woodbury.
1882 Lamont, Lansing.
1882 Ladd, William F.
1882 Le Roy, Herman R.
1882 Lapham, Lewis H.
1882 Lamborn, Robert H.
1883 Lowrie, J.
1883 Lummis, William.
1883 Lounsbery, R. P.

1852 Myers, Col. T. Bailey. (L. F.)
1853 Moore, George H. (L. F.)
1856 Monroe, Ebenezer.
1856 Manners, David S.
1859 MacMullen, John.
1859 Morrell, Wm. H. (L. F.)
1859 Moore, Frank. (L. F.)
1863 May, Lewis.
1863 Moore, W. H. H. (L. F.)
1864 Morton, Levi P.
1868 Morrison, Henry.
1868 Moreau, John B.
1868 Martin, Isaac P.
1868 Marquand, Henry G.
1868 Marsh, Luther R.
1868 McClure George.
1869 Moore, Henderson.
1870 Marbury, Francis F.
1870 Murray, D. Colden.
1870 Miles, Edward D.
1872 Meyer, F. William.
1872 Matthews, Edward. (L. F.)

1872 Marié, Peter. (L. F.)
1873 Moore, C. B.
1874 Morris, Henry L.
1874 Mailler, W. H.
1874 Marble, Manton.
1874 Morrison, Edward.
1874 Morgan, W. F.
1874 Miller, Philip S.
1874 Moir, James.
1874 Morgan, J. Pierpont. (L. F.)
1874 Myers, John K.
1874 Martin, John M.
1874 McAlpine, David H.
1874 Merrall, William J.
1874 Moulton, Clarence F.
1874 Miller, Geo. Macculloch.
1875 Mitchell, Edward.
1875 Macy, Arthur.
1875 Marcus, Arnold.
1875 Meyer, Theo. F. H.
1875 Mott, Henry A., Jr.
1875 Monheimer, Joseph A.
1875 Magoun, George C.
1875 Maclay, Moses B.
1875 Martin, Bradley.
1875 Meyer, L. H.
1875 McLanahan, Geo. William.
1876 Mitchell, W. Howard.
1876 Mattson, Morris, M.D.
1877 Matsell, George W.
1878 Morison, John C.
1878 Merrick, William H.
1878 Montant, Alphonse.
1878 Musgrave, Thomas B. (L. F.)
1878 Mason, Lieut. T. B. M., U.S.N. (L. F.)
1879 Marshall, William I.
1879 Mather, Frederick E.
1879 Motz, Ferdinand.
1879 Miller, John Bleecker.
1879 Montieth, James.
1880 Mills, D. O. (L. F.)
1880 Mason, Thomas D.
1880 Mackenzie, Lieut. M.R.L., U.S. Navy.
1880 Massey, Wm. M.
1881 McGee, Flavel.
1882 Marquand, John P.
1882 Marsh, Caleb P.
1882 Middleton, Austin D.
1882 McWilliams, John.
1882 Mury, Rev. Mylton.
1882 McKnight, C. H.
1882 Moore, W. T.
1882 Mead, Erastus F.
1882 Markoe, F. H., M.D.
1882 Mills, Samuel M.
1882 McElrath, Thomas.
1882 Morgan, W. R., Jr.
1883 Marvel, William.
1883 Miller, H. K.
1883 McKay, Donald. (L. F.)
1883 McCreery, James. (L. F.)
1883 Morgan, E. D.
1883 Mali, Consul Charles.

1870 Neilson, William H.
1873 Neilson, Frederic.
1874 Newell, John.
1874 Niles, William W.
1874 Newcombe, Isaac B.
1875 Northrop, A. L.
1880 Nelson, William, Jr.
1882 North, Thomas M.
1882 Nicholson, Granville.
1882 Nesbet, John L.
1882 Naylor, Joseph.
1882 Nelson, Richard.
1883 Noble Charles C.

1874 Ottendorfer, Oswald. (L. F.)
1874 Osgood, Franklin.
1874 Olyphant, Robert M.
1874 Oakley, E. Benedict.
1874 Owen, Frederick N.
1875 Otterbourg, Marcus.
1875 Ottiwell, John D.
1875 O'Connor, Thomas H.
1875 Opdyke, William S. (L. F.)
1876 Olmsted, Fred'k Law.

1876 Olmstead, Dwight H.
1877 O'Gorman, Richard.
1877 Ogden, Isaac C., Jr.
1878 Osgood, Prof. Howard.
1879 O'Gorman, Richard, Jr.
1879 O'Brien, Thomas S.
1880 O'Shaughnessy, John W. (L. F.)
1881 Oakley, Henry A.
1882 Oelrichs, Hermann.
1882 Osborn, W. H. (L. F.)
1882 Oppenheim, Ed. L.
1882 Osgood, William H.
1882 Olney, James B.
1882 Otis, Col. Charles G.
1883 O'Donohue, Jos. J.

1852 Prime, Frederick. (L. F.)
1852 Poor, Henry V. (L. F.)
1852 Pierrepont, Henry E. (L. F.)
1855 Pierrepont, Edwards.
1857 Pyne, Percy R.
1859 Purser, George H.
1859 Prime, Fred'k E. (L. F.)
1860 Phelps, Royal. (L. F.)
1862 Phillips, George W.
1868 Powers, William P.
1868 Paulison, John P.
1871 Potter, Howard.
1871 Peabody, Charles A.
1872 Parish, Henry.
1873 Plum, Elias.
1874 Parker, Willard, M.D.
1874 Peake, William I.
1874 Peabody, Arthur J.
1874 Penfold, William Hall.
1874 Phelps, I. N.
1874 Potter, Orlando B.
1874 Pondir, John.
1874 Paris, Sherman.
1874 Preble, John Q.
1874 Porter, John K.
1874 Packer, Elisha A.
1874 Powers, George J.
1874 Pellew, Henry E.
1874 Prichard, William M.
1875 Prentice, W. P.
1875 Pope, Gen John, U.S.A.
1875 Pfund, Anton.
1875 Peipers, Hugo.
1875 Porter, Gen. Horace.
1876 Parsons, Levi.
1876 Plum, James R.
1876 Palmer, Gen. W. J.
1878 Parsons, Edwin.
1880 Pinchot, James W.
1880 Powell, Wilson M.
1881 Post, Charles A.
1882 Parsons, Mrs. E. (L. F.)
1882 Parsons, Wm. Barclay.
1882 Pallen, Montrose A.
1882 Perkins, C. Lawrence.
1882 Parrish, James C.
1882 Pell, Wm. Cruger.
1882 Parsons, Joseph H.
1882 Percival, James H.
1882 Parsons, Samuel.
1882 Paton, John.
1882 Platt, Hon. Thos. C.
1882 Peck, Walter J.
1882 Parsons, John E.
1882 Parsons, Charles.
1882 Peck, Charles M.
1882 Phillips, Charles H.
1882 Payton, Rev. John R.
1882 Parsons, Mrs. E. (L. F.)
1882 Peterson, H. G.
1883 Parks, Robert H.
1883 Peddie, Thos. B.

1882 Quackenbos, Dr. Henry F.
1883 Quinlin, Leonard G.

1854 Rutherford, L. M.
1856 Randolph, Anson D. F.
1856 Remsen, William. (L. F.)
1856 Riker, John H.
1859 Rapallo, Charles A.
1859 Reckendorfer, Joseph. (L. F.)
1861 Rogers, C. B. (L. F.)
1868 Raven, Anton A.

1868 Rose, Cornelius.
1872 Robbins, Chandler. (L. F.)
1873 Reinhart, B. F. (L. F.)
1874 Reid, Whitelaw.
1874 Rives, Francis R.
1874 Richard, Auguste.
1874 Rogers, H. Livingston.
1874 Riker, William J.
1874 Requa, James M.
1874 Reynes, Jaime.
1874 Rhoades, John H.
1874 Ramsey, Charles G.
1874 Ransom, F. A.
1874 Rhoades, Lyman.
1875 Roosevelt, Clinton.
1875 Rives, G. L.
1875 Roberts, Nathan B.
1875 Read, J. Meredith.
1875 Rose, Charles.
1875 Rosenfeld, Isaac.
1876 Ross, William B.
1877 Rose, Theodore.
1877 Rice, A. Thorndike.
1877 Roome, William P.
1878 Roorback, Orville A.
1878 Rainey, Thomes, M.D.
1879 Redmond, James Morton.
1879 Rhinelander, Miss J. (L. F.)
1880 Robinson, Mrs. John A. (L. F.)
1881 Randolph, J. C. F.
1881 Robbins, George A.
1881 Rhinelander, Frederick W.
1882 Rhinehart, E.
1882 Ray, James D.
1882 Robbins, S. H.
1882 Reed, Wm. G.
1882 Rhinelander, T. J. O.
1882 Raven, Richard M.
1882 Redding, W. E.
1882 Riddle, Wm. Q.
1882 Raynor, Samuel.
1882 Rath, Nicholas.
1882 Rolston, Roswell G.
1882 Reynolds, Charles B.
1882 Rhinelander, Charles.
1882 Rathborne, C. L.
1883 Roberts, Sir Randal H.
1883 Rosenbaum, Albert S.
1883 Robbins, Daniel C.
1883 Richardson, Briton.
1883 Russell, Isaac F.
1883 Rowland, Thomas F.

1853 Smith, James O., M.D.
1854 Sewell, Henry F.
1856 Spofford, Paul N.
1856 Schermerhorn, Wm. C.
1856 Sherman, W. Watts.
1859 Schell, Augustus. (L. F.)
1859 Schultz, John H. (L. F.)
1860 Stout, Francis A. (L. F.)
1868 Seward, Clarence A.
1868 Shea, George.
1869 Savage, John. (L. F.)
1869 Strebeigh, Robert M.
1870 Schell, Richard. (L. F.)
1870 Sherwood, John.
1870 Schafer, Samuel M.
1870 Schafer, Simon.
1870 Seligman, James.
1870 Seligman, Jesse.
1871 Shaler, Gen. Alexander.
1871 Swan, William H.
1872 Stern, Myer.
1872 Stengel, Prof. Frederick.
1872 Steiger, E.
1872 Stuyvesant, Rutherfurd. (L. F.)
1873 Smith, James M.
1873 Slevin, Thomas E.
1873 Sturges, Frederick.
1873 Spencer, James C.
1873 Scott, Julian. (L. F.)
1873 Southworth, Alvan S. (L. F.)
1873 Sturgis, Frank K. (L. F.)
1874 Sands, Harry M.
1874 Steinway, William.
1874 Storrs, Charles. (L. F.)
1874 Sands, Philip J.
1874 Smith, Samuel Drake
1874 Sloan, Samuel.

1874 Schermerhorn, F. Augustus.
1874 Stuyvesant, Robert R.
1874 Scott, Col. Henry L.
1874 Scudder, Henry J.
1874 Stuart, Joseph.
1874 Strong, W. L. (L. F.)
1874 Steward, D. Jackson.
1874 Stevens, Alexander Henry.
1874 Sherman, Benjamin B.
1874 Shethar, Samuel.
1874 Sheafe, J. F.
1874 Schieffelin, Samuel B.
1874 Stiger, William E.
1874 Stillwell, Benjamin M.
1874 Sawyer, Warren.
1874 Sands, Andrew H.
1874 Schaus, William.
1874 Spinney, Joseph S.
1874 Salomon, Edward.
1874 Sewell, Robert.
1874 Striker, J. A.
1875 Stanford, William H.
1875 Smith, Lewis Bayard.
1875 Smith, Charles Stewart.
1875 Stewart, Col. Charles S., U.S.A.
1875 Sturges, Henry C.
1875 Schultz, Carl H.
1875 Sandford, Elliott. (L. F.)
1875 Stranahan, J. S. T.
1875 Schofield, Gen. John M., U.S.A.
1875 Schieffelin, H. Maunsell.
1875 Sibley, Gen. Henry H., U.S.A.
1875 Schiff, Jacob H.
1875 Strazburger, Oscar.
1875 Schlesinger, Alfred.
1875 Smith, Apollos.
1875 Smith, Augustine.
1876 Smith, Harsen H.
1876 Sibley, Hiram W.
1876 Spaulding, Henry F.
1876 Smith, Dwight, M.D.
1876 Stryker, Gen. William S.
1876 Stone, A. B.
1877 Schuyler, Philip.
1877 Shearman, William P.
1877 Sandford, Henry S.
1877 Sanger, Major Joseph P., U.S.A.
1877 Schaff, Rev. Philip, D.D.
1878 Scott, James.
1878 Stewart, William Rhinelander.
1878 Sanford, A. Wright.
1878 Sands, William R.
1878 Smith, S. Newton.
1878 Sabla, Theodore de Joly de.
1879 Saltus, Edgar Evertson.
1879 Simion, Leonhard.
1879 Smith, Herbert H.
1879 Stone, R. C.
1879 Speir, Francis, Jr.
1879 Stevens, Frederick W. (L. F.)
1879 Smith, E. Reul. (L. F.)
1879 Shields, Prof. Charles W.
1879 Stetson, Francis Lynde.
1879 Squires, Grant.
1880 Southwick, Henry K.
1880 Starr, Theodore B.
1880 Suydam, John R., Jr.,
1880 Smythe, Henry.
1880 Stark, L. J. N.
1880 Stokes, George H.
1880 Savery, Bartlett M.
1880 Shepherd, Sherringham A.
1881 Stone, Joseph F.
1882 Sass, Dr. Louis F.
1882 Schuyler, Spencer D. (L. F.)
1882 Schuyler, Peter C.
1882 Samson, Felix.
1882 Sayre, Lewis A., M.D. (L. F.)
1882 Speir, Archibald W.
1882 Scott, George S.
1882 Skidmore, Wm. L.
1882 Sibley, Simeon W.
1882 St. John, Wm. P.
1882 Sheffield, Dr. Lucius T.
1882 Scribner, Charles.
1883 Schermerhorn, Charles A.
1883 Strout, A. P.
1883 Simpson, George E.
1883 Stone, Sumner R.
1883 Sinclair, John. (L. F.)

1883 Salter, Thos. P.
1883 Spence, Lewis H.
1883 Smith, William Alex.
1883 Smith, Henry N.
1883 Stern, Louis.
1883 Schwenniger, Rev. Anton B.
1883 Stent, Thos.
1883 Sanger, Wm. Cary.
1883 Steers, James R., Jr.
1883 Scott, Rufus L.
1883 Sorgano, Julio F.
1883 Stout, Joseph S.
1883 Spice, Elihu, Jr.

1856 Tiffany, Charles L.
1856 Townsend, Randolph W.
1859 Tracy, Charles.
1868 Taylor, Douglas.
1868 Tilden, Samuel J.
1870 Tuckerman, Lucius.
1870 Thomson, James.
1872 Tower, Gen. Z. B., U.S.A.
1874 Thompson, David G. (L. F.)
1874 Tiemann, Peter C.
1874 Tefft, Erastus T.
1874 Thorne, Jonathan.
1874 Trevor, John B.
1874 Taylor, Alfred J.
1874 Thorne, William H.
1874 Turner, Herbert B.
1874 Terry, Comdr. Edward, U.S.N.
1875 Taintor, Charles M.
1875 Terry, Gen. Alfred H., U.S.A.
1875 Toel, William.
1875 Terbell, Henry S.
1876 Tappan, J. Nelson.
1876 Totten, Lieut. George Mansfield, U.S.N.
1876 Terry, Rev. Roderick.
1877 Tillinghast, William H.
1877 Talcott, James. (L. F.)
1878 Tucker, Rev. William J., D.D.
1878 Taylor, Rev. Wm. M., D.D.
1879 Thompson, J. P.
1879 Turnbull, Robert J.

1880 Tailer, William H.
1881 Thompson, R. H.
1881 Travers, J. P.
1881 Taylor, A. D.
1882 Thurber, H. K.
1882 Taber, Henry M. (L. F.)
1882 Thomson, Eugene.
1882 Tailer, Edward N. (L. F.)
1882 Terry, John T.
1882 Taintor, Giles E.
1883 Twombly, Hamilton McK.
1883 Tutt, W. H., M.D.
1883 Trumbull, Rev. H. Clay, D.D.
1883 Thomas, J. H.
1883 Tapscote, Frank L.
1883 Trask, Spencer.
1883 Thalmann, Ernest.
1883 Taylor, Wm. B.

1854 Viele, Gen. Egbert L.
1868 Van Santvoord, C.
1869 Vanderpoel, Aaron J.
1870 Van Brunt, Charles H.
1874 Voorhis, William.
1874 Vanderbilt, William H.
1874 Vincent, Frank, Jr.
1874 Van Rensselaer, K.
1875 Vance, Samuel B. H.
1875 Van Buren, John D., Jr.
1875 Valentine, Lawson.
1875 Von Post, H. C. (L. F.)
1875 Vanderpoel, A. Ernest.
1875 Verhuven, Henry F.
1876 Van Hoesen, George, M.
1876 Van Brunt, Cornelius.
1877 Vanderbilt, Cornelius.
1877 Voorhees, Charles H.
1878 Vanderbilt, William K. (L. F.)
1879 Voorhis, John R.
1880 Von Hesse, Christern.
1880 Van Alen, James H.
1880 Van Tassell, Frank L.
1881 Vantine, A. A.
1882 Vail, M. M.
1882 Vincent, Rev. Marvin R.

1883 Valentine, Daniel K.

1854 Webb, William H.
1854 Wetmore, Samuel. (L. F.)
1854 Witthaus, G. H. (L. F.)
1859 Ward, George Cabot. (L. F.)
1860 Winston, Frederick S.
1866 Wendell, Jacob.
1868 White, Alexander M.
1869 Weber, Leonard, M.D.
1870 Webster, Sidney.
1870 Wilson, Gen. Jas. Grant. (L. F.
1870 Wright, E. Kellogg.
1870 Weston, Theodore C. E.
1870 Ward, T. W.
1872 Wetmore, Wm. Boerum. (L. F.)
1872 Williams, Stephen C. (L. F.)
1872 Wells, Jacob.
1873 Weiner, Joseph, M.D. (L. F.)
1874 Weyman, Charles S.
1874 Waite, Chief-Justice M. R.
1874 Wheeler, Everitt P.
1874 Wadsworth, Julius.
1874 Wetmore, George P. (L. F.)
1874 Wyckoff, Jacob F.
1874 Wilder, Marshall P.
1874 Walraven, Ira E.
1874 Wooster, George H.
1875 Work, J. Henry.
1875 Wheeler, John V.
1875 White, Charles Trumbull.
1875 Wilcox, Franklin A.
1875 Wilkes, George.
1875 White, David C. E.
1875 Winslow, Gen. Edward F.
1875 Whitehead, Comdr. Wm., U.S.N.
1875 White, Loomis L.
1875 Wissman, J. F.
1876 Wedemeyer, A. J. D.
1876 Wrigley, Henry E., C. E.

1877 Ward, W. S.
1877 Waters, James T.
1877 Woodruff, Col. D., U.S.A.
1878 Whitehead, Henry M.
1878 Witherbee, S. H.
1878 Wood, Isaac F.
1878 Watson, William.
1878 Whittemore, Charles.
1878 Whittemore, Thomas W.
1879 Williams, Richard P.
1879 Watson, Francis A. (L. F.)
1879 Woodbury, Charles H.
1879 Wirths, Maurice.
1879 Wolfe, Miss Catherine. (L. F.)
1880 Ward, Samuel. (L. F.)
1880 Williams, R., Jr.
1881 Wilson, James.
1881 Wilson, John.
1881 Whitehouse, Frederic C.
1882 Welch, Uriah.
1882 Watson, Frederick.
1882 Wadsworth, John H.
1882 Wheeler, Ezra.
1882 Willis, Benjamin A. (L. F.)
1882 Waddingham, Wilson.
1882 Williams, Francis W.
1882 Williams, John L.
1882 Willard, Daniel W.
1882 Williams, David. (L. F.)
1882 Winthrop, Robert. (L. F.)
1883 Whyland, Albert E.
1883 Weeks, Wm. R.
1883 Wilson, Richard T.

1871 Youngs, Henry I.
1874 Young, Mason.
1879 Yates, Ellis Samuel.
1880 Young, William.

1875 Zollikoffer, Oscar.

FELLOWS DECEASED, 1883.

Alsop, William.
Astoin, Felix.
Berry, Richard.
Burgess, Wm. J.
Banks, James L., M.D.
Cooper, Peter.
Cooley, James E.
Coates, Isaac T., M.D.
Clymer, Edward M.
Dodge, William E.
Delafield, Lewis L.
Davis, Gilbert F.
Eldridge, Titus B.
Fatman, Lewis.
Holton, David P., M.D.
Hamersley, A. Gordon.
Hamersley, Louis C.
Kane, Gen. Thos. L.
Morgan, E. D.
Simpkins, N. S., Jr.
Smull, W. P.
Willets, Samuel.
Warner, Lewis T., M.D.

CORRESPONDING MEMBERS DECEASED, 1883.

Commodore F. H. Baker, U. S. N.
William Chambers, LL.D., Edinburgh.
Olaneta, Col. José R. de.

List of Foreign and Domestic Geographical and other Scientific Bodies with which this Society is in Communication and Constant Exchange of Publications.

Academia Real das Sciencias, Lisbon, Portugal.
Academy of Natural Sciences, Philadelphia, Pa.
Academy of Natural Sciences, Davenport, Iowa.
Academy of Sciences, St. Louis, Mo.
Academy of Natural Sciences, Minneapolis, Minn.
American Antiquarian Society, Worcester, Mass.
American Naturalist, Salem, Mass.
American Social Science Association, Detroit, Mich.
Astor Library, New York.
Bibliotheca Nacional, Rio de Janeiro, Brazil.
Boston Society of Natural Sciences, Mass.
Bureau of Education, Washington, D. C.
Caucasian Section, Imperial Russian Geographical Society, Tiflis, Russia.
Central Bureau of Statistics, Stockholm, Sweden.
Charleston Library Society, Charleston, S. C.
Circolo Geografico Italiano, Turin, Italy.
Commissão Central Permanente de Geographia, Lisbon, Portugal.
Cornwall Library, Cornwall-on-the Hudson, N. Y.
Cosmos ; Guido Cora, Turin, Italy.

Essex Institute, Salem, Mass.
Etablissement Géographique de Bruxelles, Belgium.
Ferdinandeum in Innspruck, Austria.
Geographical Society of the Pacific, San Francisco, Cal.
Geographical Society, Lyons, France.
Geographical Society, Hamburg, Germany.
Geographical Society, Amsterdam, Holland.
Geographical Society, Marseilles, France.
Geographical Society, Munich, Germany.
Geographical Society, Dresden, Germany.
Geographical Society, Hermannstadt, Hungary.
Geographical Society, Hanover, Germany.
Geographical Society, Copenhagen, Denmark.
Geographical Society, Bremen, Germany.
Geographical Society, Madrid, Spain.
Geographical Society, Weimar, Germany.
Geographical Society, Bombay, India.
Geographical Society, Quebec, Canada.
Geographical Society, Metz, Germany.
Geographische Anstalt, Gotha, Germany.
Geological Society, Edinburgh, Scotland.
Geological Survey, Ottawa, Canada.
Gesellschaft für Erdkunde zu Berlin, Prussia.
Gewerbeschule, Bistritz, Hungary,
Historical Society, Iowa City, Iowa.
Historical Society, Madison, Wis.
Hungarian Academy of Sciences, Pesth, Hungary.
Hydrographic Office, The Admiralty, London.
Imperial Russian Geographical Society, St. Petersburg.
Imperial Royal Academy of Sciences, Vienna.
Imperial Royal Geographical Society, Vienna.
Instituto Historico-Geográfico del Rio de la Plata, Buenos Aires.
Instituto Geográfico Argentino, Buenos Aires.
Instituto Historico, Geographico, e Ethnographico do Brazil, Rio de Janeiro.
Institut Géographique-International, Berne, Switzerland.
Kais. Königl. Geologische Reichsanstalt, Vienna.
Königl. Gesellschaft der Wissenschaften, Göttingen, Germany.
Königl-Sächs. Gesellschaft der Wissenschaften, Leipzig, Germany.
L'Exploration, Paris.
Library of Congress, Washington, D. C.
Library Department of State, Washington, D. C.
Literary and Philosophical Society, Liverpool.
Literary and Philosophical Society, Manchester, England.
Literary and Historical Society of Quebec, Canada.
Long Island Historical Society, Brooklyn, N. Y.

Melbourne Observatory, Melbourne, Australia.
Ministère de l'Agriculture, de l'Industrie, et du Commerce, Rome, Italy.
Museo Nacional de México, México.
Mexican Geographical and Statistical Society, Mexico.
Natural History and Philosophical Society, Belfast, Ireland.
Nature, London.
Naturforschende Gesellschaft, Emden, Germany.
Naval Institute, Annapolis, Md.
N. Y. State Museum of Natural History, Albany.
N. Y. State Library, Albany.
North-China Branch of the Royal Asiatic Society, Shanghai.
Philosophical Society, Wellington, New Zealand.
Polymathic Society, Vannes, France.
New York Academy of Sciences, New York.
New York Historical Society, New York.
Pulkowa Observatory, Pulkowa, Russia.
Real Academia Española Arqueológica y Geográfica, Madrid, Spain.
Revue de Géographie, Paris.
Revue Géographique, 37 Rue Scheffer, Paris.
Roumanian Geographical Society, Bucharest.
Royal Geological Society, Dublin, Ireland.
Royal Society of Victoria, Melbourne, Australia.
Royal Danish Academy of Sciences, Copenhagen, Denmark.
Royal Geographical Society, London.
Royal Academy of Sciences, Munich, Germany.
Royal Society of Sciences, Upsala, Sweden.
Royal Prussian Statistical Bureau, Berlin.
Royal University, Christiania, Norway.
Royal Society, London.
Royal Cornwall Polytechnic Society, Cornwall, England.
Royal Academy of Sciences, Brussels, Belgium.
Royal Institute for Philology, Geography, and Ethnography of Dutch India, The Hague, Holland.
Royal Dutch Meteorological Institute, Utrecht, Holland.
Royal Hungarian University, Pesth, Hungary.
Royal Asiatic Society, London.
Section of the Imperial Russian Geographical Society, Orenburg.
Smithsonian Institution, Washington, D. C.
Sociedade de Geographia, Lisbon, Portugal.
Società Geografica Italiana, Rome.
Société de Géographie, Geneva, Switzerland.
Société de Géographie, Lille, France.
Société de Géographie, Toulouse, France.
Société de Géographie, Rochefort, France.
Société Belge de Géographie, Antwerp, Belgium.

Société de Géographie, Paris.
Société Khédiviale de Géographie, Cairo, Egypt.
Société Belge de Géographie, Brussels, Belgium.
Société des Sciences Naturelles, Cherbourg, France.
Société de Géographie Commerciale, Bordeaux, France.
Société Normande de Géographie, Rouen, France.
Société de Géographie de Montpellier, France.
Société Suisse de Topographie, Geneva, Switzerland.
Society of Natural Sciences, Buffalo, N. Y.
State Library, Boston.
Statistical Society, London.
Statistisches Amt des Deutschen Reichs, Berlin.
The Academy, London.
The Asiatic Society, Yokohama, Japan.
The Japan Gazette, Yokohama, Japan.
U. S. Military Academy, West Point, N. Y.
Poughkeepsie Society of Natural Science, Poughkeepsie, N. Y.
Tokio Geographical Society, Tokio, Japan.
U. S. Geological Survey, Washington, D. C.
United States Coast Survey, Washington, D. C.
Verein für Erdkunde, Darmstadt.
Verein für Geographie und Naturwissenschaften, Kiel, Germany.
Verein von Freunden der Erdkunde, Leipzig, Germany.
Victoria Institute, or Philosophical Society of Great Britain, London.
Zeitschrift für Geographie, Lahr, Baden, Germany.

ADDITIONS TO LIBRARY AND MAP-ROOM, 1883.

PURCHASES.

Atlantis, the Antediluvian World, by Ignatius Donnelly, New York, 1882 ; Hand-Book to Arizona, by R. J. Hinton, San Francisco, 1878 ; A Narrative of the Shipwreck, Captivity, and sufferings of H. Holden and B. H. Nute in the year 1832, by Horace Holden, Boston, 1836 ; A Picture of New York in 1846, New York, 1846 ; Ashanti and the Gold Coast, by Vice-Admiral Sir John Dalrymple, London, 1874 ; Report of the Commission of Inquiry to Santo Domingo, Washington, 1871 ; Report upon Samoa, or the Navigator's Islands, by A. B. Steinberger, Washington, 1874 ; Memoir on the Low-Lands Estate Island of St. Martin, by Pascal A. Quinan, Baltimore, 1876 ; Report of José and Francisco Keller, Explorers of the River Madeira, Translated by Geo. Earle Church, London,

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PART I.

TRANSACTIONS

OF THE

SOCIETY FOR THE YEAR 1883.

TRANSACTIONS OF THE SOCIETY FOR 1883.

Annual meeting of the American Geographical Society, held at Chickering Hall, Tuesday, Jan. 9, 1883, at 8 o'clock P.M.

Chief-Justice DALY, President, took the chair.

The reading of the minutes of the previous meeting was, on motion, dispensed with.

The following gentlemen were elected Fellows of the Society :

Amos F. Eno, George W. Cass, J. Searle Barclay, Charles A. Schermerhorn, Maynard C. Eyre, Francis C. Bowen, L. Franklin F. Genet, Wm. V. Carolin.

The annual report of the treasurer, Mr. George Cabot Ward, was read by the chairman of the Finance Committee. This showed a balance to the credit of the general fund of $325.90 and a permanent fund of $14,417.84.

The report was accepted and ordered to be placed on file.

The annual report of the Council was then read, as follows :

New York, January 5, 1883. Since the last annual report, six regular, and one special, meetings of the Society have been held, and eight stated, and five special, meetings of the Council.

On the 10th of Jan., 1882, Gen. George W. Cullum, U. S. Army, Vice-President of the Society, read a paper entitled " The Acropolis of Athens."

On Feb. 24th, Mr. George Kennan delivered a lecture on " Siberia, the Exiles' Abode, and The Sufferings of the Survivors of the Jeannette."

On March 21st, Gen. R. E. Colston, late of the general staff of the Egyptian Army, delivered a lecture on " Modern Egypt and Its People."

On April 13th, Chief-Justice Daly, LL.D., President of the Society, delivered an address upon "Spain, the Straits of Gibraltar and Tangier in 1881."

On November 17th, Mr. Paul B. Du Chaillu delivered a lecture on his "Journeys in Norway, Sweden, Lapland, and Northern Finland."

On Monday evening, Dec. 4th, at the Society Rooms, No. 11 West 29th Street, Chief-Justice Daly read a paper respecting the authenticity of the various portraits of Columbus, and this was followed by remarks on the same subject by Mr. Nestor Ponce de Leon.

On Dec. 20th, Andrew D. White, LL.D., President of Cornell University, and late U. S. Minister to the German Empire, delivered a lecture on the "New Germany."

All of the lectures, except one, were illustrated by stereopticon views.

The annual report of the treasurer, Mr. George Cabot Ward, showed a cash balance for the general fund of $325.90, and that the permanent fund amounts to $14,417.84.

One hundred and fifty-three Fellows have been elected during the year, eleven of whom became Life Fellows by the usual payment. Six Fellows, elected in previous years, have qualified as Life Fellows during 1882.

The publications of the Society have been regularly distributed to its Fellows and also to 123 geographical and other scientific bodies of Europe and America with which this Society is in correspondence and exchange.

The additions to the Library of the Society and its Map-Room have been 826 items, of which 164 are books, 571 pamphlets, and 81 maps.

The State Survey, which owes its existence to the initiative of the Society, has continued its labors during the year, making good progress and affording satisfactory results

In conclusion the Council again congratulates the Fellows on the very prosperous condition of the Society.

Respectfully submitted,

(Signed) WILLIAM REMSEN,

Chairman of Council.

The Committee on Nominations presented the following report:

The Nominating Committee appointed to select officers to fill vacancies, under resolution of the Society passed at its meeting of December 20, 1882, respectfully report the selection of the following nominees for election in accordance with Chapter V., Section 2, of the By-Laws:

For President—Charles P. Daly, LL.D., term to expire January, 1884.

For Vice-President—Roswell D. Hitchcock, D.D., term to expire January, 1886.

For Recording Secretary—Elial F. Hall; term to expire January, 1886.

For Treasurer—George Cabot Ward; term to expire January, 1884.

For Councillors—T. Bailey Myers, Egbert L. Viele, Chandler Robbins, Theodore W. Dwight, and Joseph W. Drexel; terms to expire January, 1886.

(Signed) OLIVER P. HUBBARD, *Chairman.*
JAMES O. SMITH,
JOHN McMULLEN,
Nominating Committee.

January 4, 1883.

The report was, on motion, unanimously adopted, and the Society proceeded to a ballot, which resulted in the election of the ticket as given.

The President then introduced to the meeting Daniel C. Gilman, President of Johns Hopkins University, who delivered a lecture on the subject of the "North American Continent—Four Centuries of Discovery."

At the close of the lecture, on motion of Judge Charles A. Peabody, the thanks of the Society were voted to President Gilman for his able address.

On motion the meeting adjourned.

(Signed) ELIAL F. HALL,
Recording Secretary.

Meeting (Special) of February 5th, held at Society's Rooms, 11 West 29th Street.

Vice-Pres't Gen. G. W. CULLUM took the chair.

Mr. T. H. Lambert, of Paris, read a paper entitled, "The Origin of the name of America from the National History of the Peruvians."

On the conclusion of the reading the thanks of the Society were voted to Mr. Lambert, and a copy of his paper was requested for publication in the Bulletin.

On motion, the Society adjourned.

Meeting of February 15, held at Chickering Hall.

Chief-Justice DALY, President, took the chair.

The reading of the minutes of last meeting was, on motion, dispensed with.

The following gentlemen were elected Fellows of the Society:

Hamilton McK. Twombly, A. P. Strout, A. M. Judson, Theodore Houston, Albert C. Whyland, Wm. D. Marvel, John Byers, Geo. E. Simpson, Thomas C. Clarke, Sumner R. Stone, Henry T. Kneeland, H. K. Miller, Enoch Conklin, John Greenough (L. F.), Fredk. A. Potts, W. H. Tutt, M.D., James E. Granniss, Martin R. Cook, Sir Randall H. Roberts.

Dr. E. R. Heath, of Wyandotte, Kansas, was elected a Corresponding Member.

Vice-Pres't F. A. STOUT then introduced to the meeting Commandant Alfred Aylward, late of the staff of Gen. Joubert, Commander of the Boers in the war between the Transvaal Republic and the English.

Commandant Aylward gave an account of "Dutch South Africa," and of the institutions, mode of life, and history of the Boers.

On the conclusion of the lecture the thanks of the Society were voted to Commandant Aylward, and the meeting then, on motion, adjourned.

Meeting (Special) held at the Rooms of the Society, 11 West 29th Street, March the 5th.

XUM

Chief-Justice DALY presided.

Dr. Thomas Antisell, of Washington, read a lecture on "The Currents of the Pacific Ocean."

These were of such a character, he argued, that the theory of an open Polar Sea, as the result of their influence must be pronounced untenable. The one warm current of the Pacific towards the North was due to the monsoons, and existed only in the warm season. The ridge-like formation of the sea-bottom at Behring Strait further made the open Polar Sea impossible by intercepting the warm ocean current.

Judge Daly coincided in opinion with the lecturer.

The thanks of the Society were voted to Dr. Antisell, and the meeting, on motion, adjourned.

Meeting of March 20th, held at Chickering Hall.

Chief-Justice DALY presided.

The reading of the minutes of the last meeting was, on motion, dispensed with.

The following gentlemen were elected Fellows of the Society :

Benjamin Brewster (L. F.), Henry E. Chapman (L. F.), W. Jennings Demorest, Adalbert Ames, Leonard G. Quinlin, D. H. King, Jr., Abiel Abbot, Robert H. Parks, Thomas P. Salter, C. H. Bachem, Walter Bound, Cyrus O. Baker, J. Lowrie, Oliver F. Berry, E. J Donnell (L. F.), John Sinclair (L. F.), Henry W. Klutschak, Horace L. Hotchkiss, Edward C. Spofford, Charles J. Henry, Henry B. Hebert, Herbert Barber, Albert Aub, W. T. Colbron, S. P. Knapp, H. D. Chase, Wm. B. Beekman.

Judge Daly then said :

"We had expected to have with us this evening the Malagasy Embassy, which had accepted our invitation and had reached Philadelphia on its way hither, when a request for its presence at Washington was received. This the ambassadors did not feel at liberty to refuse, and they sent a letter of regret through their Secretary, Mr. Pickensgale. In this emergency Dr. Samuel Kneeland has kindly consented to read a paper on the Philippine Islands, and it may well be that the Society will find itself a gainer by the change."

Judge Daly then introduced Dr. Kneeland, who entertained the

Society with the result of his studies and personal observations on this very interesting archipelago. The lecture was illustrated with stereopticon views.

At the conclusion of the lecture a vote of thanks to the speaker was moved and carried, and a copy of his paper was requested for publication in the Bulletin.

On motion, the Society adjourned.

Meeting of April 16th, held at Chickering Hall.

Chief-Justice DALY took the chair.

The reading of the minutes of the previous meeting was, on motion, dispensed with.

The following gentlemen were elected Fellows of the Society :

W. F. Bishop, Wm. M. Earle, Joseph S. Decker, Rev. H. Clay Trumbull, Wm. R. Weeks, Lewis H. Spence, Harry Allen, J. T. Atterbury, Walter Bourne.

Judge Daly then said the meeting of the evening had been called to pay a tribute of respect to the memory of the late Peter Cooper. This was peculiarly fitting in this Society, since it was by the generous assistance of Mr. Cooper that it had been saved from extinction at a critical period of its history. Mr. Cooper had given the shelter and the accommodations which preserved the collections and kept the Society together for years, and all this absolutely without charge.

Judge Daly's acquaintance with Mr. Cooper for more than forty years had deeply impressed him with the consistent uniformity of that excellent man's character.

Gen. Viele spoke of Mr. Cooper's inventive faculty and executive ability. It was he who invented a method of using anthracite coal to advantage, and the nation was also indebted to him for the establishment of the Bureau of Vital Statistics.

Judge Richard O'Gorman said that Mr. Cooper had studied, most of all, the difficult science of doing good, and sought always, with increase of means, to extend the sphere of his benefactions.

The career of such a man honored the people from which he sprung.

Gen. Viele then offered a series of Resolutions, embodying the recognition of the Society's obligations to Peter Cooper and the ex-

pression of its regret at his decease, and ordering that his portrait be painted and placed in the Collection of the Society.

These Resolutions, on motion, were unanimously adopted.

Judge Daly then introduced Lieut.-Gen. C. P. Stone, late Chief-of-Staff of the Egyptian Army, who delivered a Lecture on "The Political Geography of Egypt." The speaker gave a review of the changes in the condition and the relations of Egypt to the Great Powers and to the neighboring regions of Africa during the last one hundred years.

On motion of Judge Peabody a vote of thanks was passed to Gen. Stone, and a copy of his paper was requested for publication in the Bulletin ; and the Society then, on motion, adjourned.

Meeting of November 20th, held at Chickering Hall.

Chief-Justice DALY occupied the chair.

The reading of the minutes of the previous meeting was, on motion, dispensed with.

The following gentlemen were elected Fellows of the Society : Edmund Abdy Hurry (L. F.), Alfred M. Hoyt (L. F.), John C. Goodridge, Jr. (L. F.), E. Francis Hyde, A. Bernard Jäger, Dr. J. D. Quackenbos, Jos. J. O'Donohue, James D. Fish, J. M. Emanuel, Henry L. Smith, Louis Stern, Henry Clews, Thos. B. Peddie, Rev. Anton B. Schweninger, Coe Adams, Walter M. Aikman, Robbins Battell, Robt. D. Benedict, Wm. R. Bell, Eugene G. Blackford, Thomas Stent, Wm. B. Hoyt, William Adams, Richard T. Wilson, Frank L. Tapscott, Brinton Richardson, Donald MacKay (L. F.), James McCreery (L. F.), George R. Howell, Abraham L. Jacobs, Julius A. Kohn, Wm. P. Clyde, Thomas Dickson, Wm. Alex. Smith, Albert S. Rosenbaum, Felix Gottschalk, Daniel C. Robbins, E. B. Morgan, Theodore M. Banta, Charles W. Bangs, Edward Barr, Tunis G. Bergen, Ludovic Bennet, Frederick Blake, Charles Mali, George M. Coit, James M. Ives, J. H. Thomas, Flamen B. Candler, Edmund Terry, Wm. Cary Sanger.

John A. Halderman, U. S. Minister to Siam, and Ensign Geo. C. Foulke, U. S. Navy, were elected Corresponding Members.

On motion, duly seconded, the following gentlemen were appointed to represent the Society at the Centennial Celebration of Evacuation Day :

Gen. Geo. W. Cullum, Judge C. A. Peabody, Rev. R. D. Hitchcock, Thomas C. Acton, N. P. Bailey, T. Bailey Myers, Edwards Pierrepont, H. B. Hammond, Joseph W. Drexel, Prof. T. W. Dwight, Wm. Remsen, E. F. Hall, Douglas Taylor, D. O. Mills, Chandler Robbins, W. G. Hunt, Robt. Lenox Kennedy, Clinton Gilbert.

President Daly then introduced the speaker of the evening, Mr. George Kennan, who delivered an entertaining lecture on "A Journey through Southeastern Russia," with descriptions of the scenery, inhabitants, and natural features of the country. A number of stereopticon views were shown after the lecture.

On motion, a vote of thanks to the speaker was passed, and he was requested to furnish a copy of his paper for the Bulletin.

On motion, the meeting adjourned.

Meeting of December 17th, held at Chickering Hall.

Chief-Justice Daly, President, took the chair.

On motion, it was voted to dispense with the reading of the minutes of the previous meeting.

The following gentlemen were elected Fellows of the Society :

Geo. W. Banker, James R. Steers, Jr., Danl. K. Valentine, Adrian Van Sinderen, Isaac F. Russell, Wm. Lummis, R. P. Lounsbery, Theodore Wilson, Arthur T. Hendricks, Thos F. Rowland, Charles C. Noble, Walter Kerr, Rufus L. Scott, Julio F. Sorzano, Spencer Trask, Ernest Thalmann, George Bowles, Joseph S. Stout, Wm. B. Taylor, Elihu Spicer, Eustace W. Fisher.

The President then introduced to the meeting Mr. Alfred R. Conkling, who delivered a Lecture on "Mexico: Her Physical Geography and Resources." After a sketch of the great features of the country, Mr. Conkling gave an account of the projected lines of railway, amounting in all to 13,000 miles. Many illustrations were given by the stereopticon.

The thanks of the meeting were voted to the speaker.

On motion, duly seconded, the following gentlemen were then chosen a Committee on Nominations to select Candidates for vacancies, to report at the annual meeting in January, 1884 :

Joseph J. Little, *Chairman*, Henry W. Dunshee, Alexander McL. Agnew.

On motion, the Society then adjourned.

PART II.

PAPERS READ

BEFORE

THE SOCIETY DURING 1883.

Note.—THE AUTHORS ALONE ARE RESPONSIBLE FOR THE CONTENTS OF THEIR RESPECTIVE PAPERS.

DUTCH SOUTH AFRICA.

Its Hydrography, Mineral Wealth and Mercantile Possibilities.

BY

COLONEL ALFRED AYLWARD,

Late of the Staff of General Joubert, Commander of the Boers in the late War between the Transvaal Republic and the English.

In 1876, at the December meeting of this society, Miss Russell delivered an address on the Republics of South Africa, and your interest in their fate was again manifested when in the annual address of your President, Chief Justice Daly, a most concise epitome of their recent history was made a part, and I must say not the least interesting part, of the proceedings. It is for me to endeavor to place before you in as few words as possible the main features, resources and wants of those little known states.

They occupy nearly the whole of the elevated habitable plateaux of Southeastern Africa from 23° to 31° of south latitude and are drained by, with some minor and unimportant exceptions, two principal systems—the water-sheds of the Limpopo and of the Orange river. Viewing the two Republics, for geographical purposes, as one naturally demarked territory, they may be described as being bounded on the east by the steep declivities, facing eastward, of the Drakensberg mountains, on the west by territories wholly or partly desert, north by warm, well wooded, broken country, descending to the valley of the Limpopo; and south by the Orange river up to the point of junction with

Vaal river, its grandest tributary. The Drakensberg mountains present a steep face towards the east, following, however, the line of the coast which, with the countries between the water's edge and the mountain wall, appears to have been formed by erosion ; to be in fact a new shore made by the breaking away of the vast table-land of the country after some violent process of upheaval, by which the plains were tilted up to a height on the eastern side of from 8,000 to 10,000 feet. The few rivers, therefore, that drain this part of the continent, falling into the Indian ocean, are to all intents and purposes mountain torrents of greater or less velocity; few of them being navigable even for ten miles from the mouth, and all of them being obstructed by vast dykes of trap and other rocks, through weak places or hollows in which the stream waters had to force themselves downwards towards the sea. Of course, the vast escarpment of the mountain range presents no regularity of feature towards the plains at its foot. There are in places giant buttresses that present themselves at angles to the general bend of the great "berg," as it is called, and the whole face of the range is fissured by glens and valleys of every variety of form, depth and ruggedness, where the downward and outward flowing waters have found their way towards the ocean ; but still the impression on the mind of the visitor first scaling those lofty hills remains, that Central South Africa, as a whole, is a vast uptilted table-land, of which the Drakensberg marks the eastern limit.

Of the geology, divisions and resources of the lands between this great wall and the sea, I need say little, save that they are fitted for occupation, and are to some extent occupied by industrious agricultural and trading com-

munities, of which Natal, a British colony, is the principal, and that, whilst fertile, producing at various elevations sugar, coffee, opium, tobacco, corn, wheat and all the temperate, with a few of the tropical fruits, they afford no hope to mineral prospectors, and are unlikely to be ever the seat of thriving manufacturing populations. Above the Drakensberg lie the lands occupied by the independent Boers. These are divided into two by the Vaal river, a stream having its rise in east longitude 31.

Of the more southerly of these Republics I shall speak first. It is called the Orange Free State, and has a population of 69,000 white and 72,000 black people, and it lies almost wholly between the Vaal and Orange rivers, to whose waters it sends several tributaries, the main feature of these flowing northwards being that they divide the open country into sections, flow almost parallel to each other, are fringed by willow trees and acacia thorns, are never navigable, but are liable to be swollen by floods during the summer or rainy season, and to corresponding shrinkage during periods of drought.

The peculiarity of the Orange Free State is, undoubtedly, the existence all over it of bodies of water called pans. Of these some are permanent, containing millions of gallons of water, whilst others are liable to become dry, when they present the appearance of vast, depressed plains covered with reeds or grasses. One or two of these lakes or ponds are brackish, and in the angle between the rivers several exist that are bitterly salty, and from which annual crops of salt are gathered by the farmers for the use of their stock and households. The principal of these salt pans is in the small district of Albania, which, together with the Diamond Fields country, now known as Griqualand West,

was, in 1871, against every principle of justice and contrary to the faith of treaties, seized by the British Government and annexed to the Colony of the Cape of Good Hope. As one proceeds westward from the Drakensberg at Harrysmith, going towards the Diamond Fields, the rugged mountain summits rapidly give place to plains, rolling but even, and very regularly descending toward the setting sun. Although this country obtains a very fair amount of rain in the season, yet it is on the whole but poorly watered, the surplus flowing either into the lowest levels, the natural pans or small lakes before referred to, or rushing off by the tributaries to the main streams. Hence artificial means have to be largely resorted to for purposes of irrigation. Huge reservoirs have to be built by individual farmers for the conservation of the surface drainage and even the capital city of the Republic, Bloemfontein, is dependent upon such a provision for the main portion of its water supply. A reservoir in Africa consists almost always of but a single puddle-bank or containing wall. Such are known locally as "Dams," the name of the container being given to the imprisoned water as well as to its imprisoning wall. In a country where running streams are of comparatively rare occurrence, population may be expected to be of the sparsest. Here it is notably so. The whole land is divided out into huge farms or rather *plaatzen* of from 6,000 to 12,000 acres each, and these afford grazing ground to fine flocks of sheep, some excellent horses, and about 1,000,000 head of horned cattle. The houses of the inhabitants possess a notable degree of comfort. Building stone of good quality exists nearly everywhere, and material for the manufacture of bricks of middle quality is abundant. The farmers cultivate portions of their farms, and the

descendants of Kafir tribes resident within the Free State borders gain yearly from their gardens large crops of millet, corn, potatoes and pumpkins. The whole of the surplus finds a ready market on the Diamond Fields, where, from the nature of the soil, and the peculiar industry that prevails, but little effort is made towards the production of fruits or vegetables. In the Orange Free State farmers also cultivate small orchards; peaches, apples, pears and cherries growing fairly well to the eastwards on the mountain farms; whilst, as one descends towards the Diamond Fields, grapes and oranges are to be met with. It must, however, be conceded that no very marked progress has as yet been made anywhere in the direction of high or even of moderately scientific farming, the Boers have as yet not been sufficiently rested from the fatigues of their migrations, nor long enough eased from the pressure of war and political dangers and threatenings to have fully adapted themselves to the settled conditions of agricultural life. A very few ostrich farms exist in this country, in fact, as a great industry, ostrich farming has tended to confine itself to the Eastern and Northeastern districts of the Colony of the Cape of Good Hope, and this in face of the fact that the plains of the Orange Free State were in an especial and peculiar manner the home of the wild bird.

The towns of the Orange Free State are few in number. The Capital is a flourishing place of business and *entrepot* of commerce, having three newspapers the most important of which, *The O. F. S. Express*, is printed in Dutch and English and has a circulation in and out of the State of 30,000 copies. There are in Bloemfontein several very valuable educational establishments and many churches, the principal of which are the Dutch Reformed, English Epis-

copal and Roman Catholic. It is greatly to the credit of the Free State Republicans, as well as to the inhabitants of the neighboring colonies, that bickerings about religion are wholly unknown amongst them, and this notwithstanding the fact that the Dutch Boers are Calvinists of the strictest type, sturdy Protestants who seek justification for their exodus, their wars, in fact for their very existence, from the Bible.

Proceeding further westwards towards the junction of the two great rivers, the line of 27° east longitude being reached, a sudden change takes place in the soil of the country, vegetation characteristic of the edge of the Karroo desert discloses itself, the grasses disappear almost wholly and white kaolin or china clay begins to encumber the surface, sometimes showing up in vast fields, like beds of white limestone, and at other places peering out above great reaches of sand on which grows but a scanty, tussocky, reedy and non-nutritive grass. Then black looking ranges of basaltic rock begin to crop up and these, from the width of the plains and all but uniform level of the country, become features of intrusive importance. Water becomes scarcer as the seat of the diamond industry is reached; in fact from the Vet river to Kimberley, save for pans and dams, the country would be a veritable desert, except along the course of the Modder river, a stream of but little importance, and which is at best but a summer torrent. The mines, Kimberley, de Beers, Bultfontein, Dorstfontein and Alexandersfontein are situated on the spurs and sides of a swelling ridge that trends nearly east and west, marking the centre of what it is reasonably asserted was once the bed of a vast lacustrine lake. Kimberley ridge is in

fact, at this point, nearly the dividing range between Modder and Vaal rivers.

The great feature of the country is, of course, Kimberley mine, a pit, the surface area of which was seven acres, now worked down to a depth of nearly 400 feet, surrounded by vast walls of shale lying in strata, wholly undisturbed and showing no marks whatever of having suffered any displacement from intrusion from below, and this in apparent defiance of the fact that the shale beds are intersected by giant reefs of igneous rocks, which show their scarred and blackened edges above the country in all directions. The hour at my disposal will not permit of any reference to the various theories that exist as to the formation of the diamond, or as to how its deposit occurred under such circumstances as exist in Africa, but I cannot refrain from pointing out the fact that westward of the known fields, but within the diamond bearing country, are to be seen what may be described as mud geysers, bodies of mud in a continual state of ebullition, some cold, some hot, but all constantly giving vent to jets of carbonic gas whose struggles to escape cause the whole mass of muddy matter to present an eruptive appearance. The depth of these volcano-like bogs has not yet been ascertained ; instances are known of men and animals having been swallowed up in them. They are invariably, as are the diamond mines, surrounded by reefs of solid rock, worn as regards the interior edges, but showing no marks of upheaval. A study of these mud geysers might result in the attainment of some certain knowledge as to the creation of precious stones.

Of the rivers that bound the Orange Free State, very much need not be noted here. They are full, or comparatively full, for six months in each year, and the Vaal river,

in the latter part of its course westwards of the twenty-seventh degree east longitude, flows in a very irregular and tortuous channel through valleys abounding in hills of shale and intrusive ironstone, and, wherever diverted by obstacles, seems to have left on the summits and sides of all hills that opposed its course, before it finally shrunk to its present bed, vast deposits of clays, sand, and gravels, from which at various times, but chiefly in 1870, diamonds were washed out to the value of at least $15,000,000.

It is not known of these diamonds whether they came from a distance or entered as a local accident into the composition of the gravels. It is here important to mention that Vaal river was undoubtedly known to and explored by the Portuguese long before the Colonists of the Cape dreamed of pushing their way northwards in search of extended pastures or political freedom. I was amongst the earlier, in fact the earliest mining pioneers of this important region. Our work was at best but a rediscovery. We found, the Rev. Father Hidien, an Oblate missionary and myself, the remains of religious buildings on the banks of Vaal river, near the present village of Pneil, and in the cellar of one of these, under a groined arched roof, a Roman Catholic altar. When the Portuguese receded or died out from this mission we could not say. Undoubtedly they were not known, nor remembered in 1816, when the Griquas and Hottentots pervaded this part of the country. The river banks are everywhere fringed with willows of great size and age, and occasionally, where caves occur in the rock formations that show up in places, some remarkable vestiges of forgotten barbarous races are to be met with. A Mr. Kidger Tucker, of Kimberley, might be consulted to advantage on this subject. One of his discoveries in 1874

was of a vast figure of the sun, surrounded with rays, or what is called "a glory," chiselled on a rocky monolith, natural and imbedded, of so hard a texture that no ordinary cold chisel would enter it.

The people settled upon the South African Diamond Fields cannot be passed by without notice. They have, by their labors, their industry, and their enterprise, raised the English Colony of the Cape of Good Hope from the frightful condition of insolvency and stagnation in which the end of 1868 left it; and had it not been for the presence amongst them of a sordid mercantile element, that would sacrifice anything, however holy or noble, to be enabled to do its shopkeeping in security, the mining community would have led in the struggle for South African unity and freedom. Whether from the fact of being isolated from the rest of the world by the belt of plains and desert that surround them, or because, which is more likely, the men who first occupied the fields came of more cultured classes than are usually found on "diggings," I cannot say, but from the dawning of the diamond industries in Africa, the mining communities have borne an exemplary character. Crime was for years almost unknown, and crimes of violence and open robbery have never yet become a feature of the life of this comparatively wild and but newly settled region. There are on the fields gentlemen, and ladies too, of various nations, of diverse habits of thought and dissimilar creeds, who manage, amidst the squalor of a mining camp, which is rendered fetid by the presence of cheap black labor, and sordid through the rascalities of illicit diamond buyers, to maintain around themselves a pure and gentle home life, an atmosphere of refinement and decency that is an exemplar and a benefit to the older residents of the country.

Of course, there have been some adventurers there, men of wild type and erratic lives, gamblers, and perhaps a desperado or two, but still it must be said of the people as a community, that they were, and are, more free from crime, outrage, and even notable folly and eccentricity, than any other body of miners that were ever located.

Sad trials and struggles, indeed, have been amongst them. When diamonds were first discovered, their distribution was as little understood by the earlier diggers as their formation was by a majority of so-called scientists. Good luck was the tutelary diety of the poor miner, and some of the votaries of the god were but scurvilly treated. I knew one man, Mr. Ricketts, who worked for nine months without finding a diamond, however small. If he wrought for a company luck quitted them. If he scraped, as he often did for weeks at the "sorting table," as the slab on which the washed gravel is turned over and inspected bit by bit to search for the precious stones was called, the dirt proved barren; claims touched by him petered out, yielded blank from the moment he brought his unlucky foot near them; in fact, he was like one charmed against diamonds, accursed or set apart from the diggers around him. At length no one would employ him. He dug and scraped painfully by himself, carrying in a sack, on his half-naked shoulders, the gravel he got out of his claim, hundreds of yards to the river to wash it, and then only getting a turn to put it through another man's cradle, which the owner would lend him during his own spell of actual digging out, carting, or perhaps prospecting. Time passed on, and this unlucky digger, still not finding, was compelled to part from his family, which, no longer able to support, he was forced to see return to the Colony of the Cape of Good Hope. He

fought on, but fell still lower. In the depth of his despairing, when two days hungry, a good man, Van der Byl, lent him £5 ($25), and advised him to fly from the scene of his misfortunes and go to work at his former trade, that of a baker, far away from the treacherous and delusive mines. Ricketts took the money but held on to the fields; but alas, when even that scanty supply was gone he had still found nothing. The end came swiftly. He had sold even his flannel shirt for two shillings to buy food, and parted with his well-worn pickaxe to satisfy the pangs of hunger. Then, utterly broken in mind and body, he went to an unused grave back of Pneil and lay down in the gravel pit to bury his unlucky life in the breast of our common mother earth. Night came and he sank to rest in rain and storm, never expecting or even wishing to open his eyes again; but his ill-luck had not yet left him. In the morning he awoke hungry and despairing, and too weak to rise; but that morning's sun shining on the gravel-walls of the pit he had lain down to die in showed him within reach of his poor, trembling hands a twenty-nine-carat white diamond, a sight sufficient to restore him to life, hope and activity. Shall I tell of his return from the grave to the camp? No! Of the naked man stepping into the diamond merchant's office with his treasure? No! But I will tell you that to-day Ricketts is a responsible, well-off, reputable man, whose happy, healthy, nicely-reared family cannot picture to themselves their father as a wandering, hungry wretch, who lay down in the rain to die in despair in the same hole with a $90,000 diamond.

Diamonds Fields life had its ups and downs, but it was a hardy, heroic, plucky sort of existence, with much charm, much discomfort, and perhaps much disappointment; but

still it was a very satisfying, healthy and natural existence, dashed with fewer treacheries and illuminated with many gayer friendships than make or mar the life of cities such as this. Its worst feature was the growing up, together with the place and its vast prosperty, of an idle class, who called themselves diamond buyers and brokers, but who were really middlemen, fellows whom the peculiarities of the diamond trade enabled to live as "go-betweens" between the miner and the merchant. These creatures actually swarmed on to the fields to such an extent, that at one time there were more diamond buyers than miners, and as many brokers as laborers on the mines. Such a vast crowd of non-producers, of men who consider that the world owes them a living and they must get it anyhow, not unnaturally produced dishonesty, fostered dishonest laws, and supported dishonest government. Hence, illicit diamond buying, thefts from the mines by servants, and a government foreign to the genius of the place, a spending, warlike, unthriftful rule, protecting only capital and encouraging speculation and peculation, at the expense of workers.

The result is to be seen to-day. The original miners have, as a rule, sold out their claims and left the dry diggings to the operations of a speculative class of men who, by the clever formation of companies and by dint of manipulation and watering of stocks to an extent never warranted by the profits of the industry, have cheated hundreds of innocent, credulous investors, and, after creating a fictitious era of paper prosperity, have all but ruined the Diamond Fields, crushing credit to the lowest and driving legitimate speculation out of the country.

It is needless to say that the country to the north and west of the fields is but sparsely inhabited. The English,

although anxious, for speculative purposes, to possess these lands, have never fairly settled down to their occupation. There are but few white occupiers of the so-called territory of Griqualand West, save and except some Orange Free State Boers, who, on Free State titles, own the older and fairer portion of the country. There are, however, attractions for many men yet to be found in the Vaal river district. There are rivers whose unexplored, unexposed beds contain fortunes as yet safe from the hands of explorers and prospectors; and one range of mountains, the Langeberg, in which known mines of great value, but wholly undeveloped, exist.

Asbestos, lead, silver, cinnibar, auriferous quartz, and inferior precious stones abound; but to any man or body of men able to secure the wealth of the river bottoms of this territory something more than mere fortune is offered by nature in this region.

As an agricultural district the portion of Griqualand north of Vaal river is not likely to prove tempting to permanent settlers; the desert is encroaching, nay, has encroached visibly within living memory, and, except as a place for cattle-breeding or ostrich farming, the land is valueless, from a colonist's point of view.

One of the most remarkable natural curiosities of the country is a cave in the earth, having but a small opening to the veldt, as the prairie is called in South Africa, but widening out below into a place of considerable extent. This hole was used as a prison and place of punishment by the savages, and is at present infested by huge snakes. It is called Daniel's Kuil.

In Griqualand West, as in the Orange Free State, large game is scarce, the carnivorous animals having almost

wholly disappeared. This is only to be accounted for by the fact that the farmers, having shot or driven away all the larger antelopes, the carnivora have not whereon to live. Yet, strange though it may seem, but fifteen years ago the lordly lion abounded upon the plains; whole districts were considered to be "lion-veldt," or dangerous, from the number of these beasts that made their homes there: and the streets of rising towns, notably of Harrismith, were unsafe after nightfall from the persistency with which wild beasts made their way into them in search of prey.

A man named Heefers, formerly land steward to Mr. de Beer, the original proprietor of the farm on which the great diamond mines are situated, claims to have discovered in the neighborhood of Tauns, on the Hartz river, an animal combining the principal peculiarities of shape and habit belonging to the bear and the lion, and the villagers profess to have seen and been hunted by a monstrous creature tallying with the description given by this man of the animal he had seen; but although its existence is a matter of common belief, such a nondescript has not yet been captured, nor, indeed, seen by any reliable European hunter. The spoor, or footmarks, however, of a gigantic plantigrade animal have been frequently observed on the desert plains to the northwest.

Besides Boer farmers, diamond miners, and English, Jewish and colonial traders and shop-keepers, of whom there are in all about 8,000, the population of Griqualand West consists of 12,000 laborers, Kafirs, Hottentots and others, working for wages as miners or servants, and 15,000 wandering, shiftless and very degraded mixed tribes of Batlapini, Bushmen and Griquas. Some of these are

very poor, sustaining life, as I know of my own knowledge, during some months in each year, by earth eating, to help out their scanty stores of food and milk. The earth they eat is whitish and of a soapy consistency, coloring water rapidly and dissolving easily. It contains infusorial remains and talc. Edible clay of a similar quality exists in Natal, in Weenen county, and was at one time, after Chaka's conquests, the main support of the wretched few who survived his terrible raids.

The inhabitants of the Orange Free State proper consist in the main of Dutch Boers, with a slight intermixture of English and Irish colonial farmers and some 2,000 German and, as I must call them, for the sake of distinction, "Hollander" settlers, but all are republican in politics, thrifty and fairly well off. The Free State possesses no manufactures, and imports very largely foreign built, chiefly American, carriages and agricultural machines and implements, wearing apparel, cotton, woolen and linen goods, spirits, wines, building materials, books, boots and shoes—in fact, all consumables that cannot be reckoned as natural products of the country. The exports are diamonds, wool, hides, live cattle, ostrich feathers, a few of the inferior precious stones and curiosities of the country, including rare animals, skins and Kafir truck. The country has been subject to fearful droughts. In 1861 the farmers had to quit their stations and "trek," as it is called, to the river banks. The streams, even in Vaal river, stood still, the river beds being in places wholly bare of water. Since the construction of the dams to retain the summer rain water the worst inconveniences of the droughts have been evaded. The only change of importance that has taken place in the natural circumstances of the country

within living memory is this, and in connection with the hydrography of the land it is of no little importance.

In 1852 the country, because of the rapid evaporation of part of the overflow from rains and the immediate subsidence into the soil of much of the remainder, presented the appearance of a wide desert, intersected by a few unreliable rivers, but dotted over with "pans," some few of which only held water permanently. If the traveller arrived at one of these and found the water supply scanty or entirely dried up, he and his teams suffered inconvenience, if not positive danger. Places such as Dorstfontein, or "thirsty fountain," a large pan place, and now the seat of a mining town, obtained an ill name from being often bare of water. Now, however, the hardening of the ground in such neighborhoods by the trampling of stock, together with the making of paths towards the water places by the feet of innumerable herds, has caused the rain surface water to drain unobstructedly and more rapidly towards the pans and hollows, which now always yield a plentiful supply of water. Dorstfontein has actually lost its character for thirstiness, and when I last saw it presented the appearance of a lake some sixty acres in extent. The evil reputation of the country for drought had a strange political outcome in the period of the last British occupation. Sir George Grey actually recommended the abandonment of the country, on the ground that it was an uninhabitable desert. To his recommendation, and not to any desire to give the poor Boers liberty, is mainly to be traced the British policy of abandonment. Later, when the Diamond Fields were discovered, and Free State prosperity became a patent fact, the British Government strained every nerve to destroy the republic, and they invaded and annexed the

most valuable district of the state, paying since, as was mentioned in the address of your President in 1877, a very meagre and insufficient sum to the plundered state, by way of compensation for the outrage which the people were too weak to resent.

The inhabitants of the Orange Free State, other than Boers and persons of European descent, are chiefly Basutos, Barolongs, Griquas, Korannas and Batlapins, with a few Hottentots and men of mixed race. Of these the Barolongs alone are *quasi*-independent, occupying a mountain called Tha-b-n-chu within sight of the capital. These people are making marked advances in what we choose to call civilization, having churches, schools and square-built houses, and depending to a very large extent on agriculture for their support. The Basuto colonists are, as a rule, paid servants or squatters with the farmers; a few, however, have shown an aptitude for the mechanical trades. The other races are mostly employed as wagon drivers, herdsmen, shearers of sheep and cooks about the farmhouses. There is little or no fuel in the Orange Free State, the vast plains being wind-swept and treeless, whilst the only known coal mine is undeveloped. *Bois de vache*, or cow mist, is the principal fuel, but the weather is usually mild; fires are seldom used in the houses of the farmers, and the climate is so salubrious that persons of any sex or age gain health by, rather than lose it through, exposure to the night air. As a sanatarium for cases of lung disease the Free State is much approved.

The traffic arrangements of the state are very primitive. Goods and produce are conveyed by the gigantic, slow-moving ox-wagon, averaging, when loaded, two miles an hour. The mails are carried by horse-carts, usually of the

pattern called the "buggy," and on the great main road by well-equipped, well-horsed coaches, the establishment of which is due to the celebrated Californian pioneer Cobb. The state is now connected with the territory of the Cape of Good Hope by a very fine bridge spanning the Orange river near Fauresmith. Its exports mainly leave South Africa by way of Natal and Port Elizabeth.

The Orange Free State is all but free of debt, and is ruled by a President and House of Representatives called the Volksraad. The Supreme Court is well administered; crime is almost unknown; there is no standing army, save an artillery division of twenty-five men, and, if left to itself, the community promises to be a prosperous and rapidly increasing one. Great attention has been paid to education, comparatively vast sums being expended for the purpose; but over-education is unknown. The Free State has no educated class of idle young men to impoverish and degrade its professions. Wages are good, food plentiful and cheap, the trades are well employed and domestic virtue and hospitality the rule everywhere.

The Transvaal.

This republic, which is bounded to the south for the most part by the Vaal river, and east by the Drakensberg and Lebomba mountains, is accessible from the British colony of Natal by only one main road, that running northwards from the seaport Durban, through Pietermaritzburg and Newcastle to the now famous Majuba mountain. It has, however, another unused gateway, the port whose merits it is, in the best interests of peaceful trade, part of my mission to make known. Delagoa bay is four degrees

north and 2.30″ east of Port Durban. Its approaches are easy, and it affords at all seasons of the year anchorage and shelter of the best sort. The harbor is a natural one, is safe in all weathers, and is wide enough and deep enough to shelter at one time a larger number of vessels than can obtain entry into the other South African ports taken together. All other ports, bays and inlets on the East Coast of South Africa are obstructed by dangerous bars, but Delagoa bay is accessible to vessels even of the largest known tonnage. It, together with a strip of land along the coast—all that remains to them of once far-reaching territories—is the property of the Portuguese, a nation who have very properly resisted every attempt by the grasping British Empire to wrest this hopeful possession from them. Landing at Delagoa, one has the advantage of escaping the use of surf boats; thereby avoiding expense for vessels, however large, can disembark cargoes right up to the jetty of Lorenzo Marquez, a small fortified town, presided over by a governor, and usually occupied by a battalion or two of Portuguese troops. From the landing-place to the confines of the Transvaal, a distance of forty miles, the trail towards the interior passes over flats of great extent. These are sandy and unhealthy, much of the surface being marshy or covered with pestilential lagoons, from whose festering bosom come fatal exhalations that give rise to the remittent bilious fevers of the coast. Thence from the boundary the country rises at the rate of about fifteen feet in the mile to the Lebomba mountains, which are really but foothills of the Drakensberg. Along this line the path is often bordered by magnificent forests of hard wood, including white ironwood, one of the most durable and valuable timbers in the world, and affording a vast stock of material

for sleepers and railroad construction. The country is, however, infested by the "fly" known as "tetse," the sting of which is fatal to all domestic animals; even the dog, donkey and mule succumbing to its virulence of poison after a period of more or less lengthened suffering. The peculiarity of the death from "tetse" stinging is that the animal suffers no instant pain, but dies on or at once after the oncoming of the next succeeding showery or rainy weather. The *habitat* of the fly has by all observers been noted to be that of, for the time being, the large game, and as the wild animals recede, the fly stripe appears to go farther and farther back into the country. After this explanation I need hardly add that game of all sorts is abundant in the low lands, lying between the Lebomba and the Indian ocean. During winter, that is to say, in the months of May, June, July and August, the coast districts are healthy, but even hardened hunters fear to expose themselves to the summer and autumn malaria, which proves fatal to 60 per cent. of those who seek to pass through the coast belt at wrong seasons. Railway enterprise alone can overcome the difficulty, and it was the knowledge of this fact that induced the late President, Thomas Burgers, to visit Europe and seek capital for the construction of an iron road to the republican capital. He succeeded to some slight extent. The Portuguese granted a very valuable concession to George P. Moodie & Sons, in respect of the forty miles of works of construction needed at the coast end of the line. Money was raised for the Transvaal extension, but Great Britain had colonies whose rapacity and selfishness stood in the way of Transvaal progress, and that country was forcibly annexed within a few days of the landing of the material destined to bring

it into connection with the outer world. At the date of speaking, there are lying at Delagoa bay rails and plant to the value of $600,000; and the Portuguese Government, as gentlemen in this city have recently been informed by American Minister Francis, now at Lisbon, are anxiously awaiting an offer from some substantial syndicate or firm on which to base new concessions. Labor for construction, for ordinary navvying, and for the making of earthworks, is easily obtainable from the districts bordering on the projected track, and a company undertaking the work would receive back every dollar of its outlay for native labor, as profits on the exceptionally lucrative trade that must follow their construction of stations in a land where the people have many wants but no sources of supply. From the end of the Portuguese line to Pretoria, the capital of the Transvaal, the distance is but 240 miles by the longest surveyed route, which lies mostly over vast plains, with a gentle grade westwards. Although all this portion of the Transvaal is more than fairly well watered, streams and rivers abounding, yet there are no serious engineering difficulties to be met with in the surveyed way of the proposed line, which, it is estimated, can be constructed for $12,000 per mile.

The central portions of the Transvaal consist of a vast plain, broken by occasional streams, flowing, in the event of those having their fountains south of 26 degrees south latitude, into Vaal river, and of those taking their rise on or to the north of this line, turning northwards till the confines of the plateau are reached, when they invariably sweep away to the east, falling into the Indian ocean. In the extreme east of the country, however, exists a system of short rivers running rapidly off towards the rising sun, and after

pouring through gaps or cañons in the Lebomba mountains, descending to the plains that lie between the bergs and the coast. Of these rivers, but one, the Usutu or Maputa, is navigable in any part, and it only for a distance of seventy miles from its mouth or *debouchure* into Delagoa bay; but its course even here is through dense forests, the land of the lion, the wild African buffalo and the "tetse" fly. The rivers flowing into the Vaal river and draining the southern edges of the Transvaal plateau, are not either numerous or important, the principal of them being the Mooi or beautiful river, which waters the town of Potchefstroom, and is so delightfully easy of access everywhere as to be useful for irrigation, being fitted to be led out, at any and every part of its course. The country between the south of the great plateau and Vaal river resembles in every respect the Orange Free State, altering also in appearance as do the Free State plains, as one goes westwards, from grassiness to sandy sterility, till is reached the limit of English rapaciousness at the edge of the Diamond Fields. The land is, however, better watered than is the Orange Free State. The grasses are closer and finer; some timber is to be found in favored localities, and the soil for agricultural purposes is highly valuable.

On the plateau, except in the stream valleys, the country is level, cool, averaging 60 degrees all the year round, comparatively treeless, but in places boggy, and nearly everywhere intersected by streams at an average distance each from the other of fifteen miles. There are, however, two or three reaches where running water cannot be met with for distances of eighteen and twenty miles. The plateau is healthy for human beings of all races; and animals of all sorts seem to thrive well upon its grasses, which,

according to prevailing South African custom, are annually burned off. Sheep, producing, as I am informed by Boston wool merchants, the very finest wool in the world, abound in this favored region ; horses, cattle and goats are profitably reared and the farmers enjoy a very great degree of solid comfort, and this although their houses are, from the high price, I might almost say the utter unobtainableness, of building timber, but small cottages of no pretension to beauty or size and having floors of hardened clay, grass roofs, and but few windows.

These plains are, however, destined to be the seat of vast industries. There and thereunder coal of the most valuable sort exists, cropping out in vast seams at places degrees removed from each other. Iron ores are abundant, and to the northeast stretches a vast district of copper and cobalt bearing country, a land showing visible traces of the past workings of some forgotten race of miners. In the district of Lydenberg and in the near vicinity of the town of that name are some workable auriferous alluvial "diggings," but no "mines" of the precious metals have been developed, although quartz reefs having a promising strike are abundant. The bottom rock of the country is quartzose granulite, spoken of by some as porphyritic granite. The northern part of the plateau trends rapidly downwards to the bottoms and wide alluvials of the Limpopo districts, yielding rich mineral indications and being fertile beyond comparison with any known land. The northwestern end of the plains yield, besides semi-tropical fruits and products, argentiferous galena and some stream tin, whilst the southwestern extreme, falling away towards the Kalihari desert, is notably fit for ostrich cultivation on the largest scale, fattens cattle

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with really wonderful rapidity, and is interspersed with pans, some of which, like those of the corresponding longitude in the Orange Free State, yield annual crops of salt. The waters that go to form the parent streams of the Limpopo take their rise in the Mahaliesberg range, a mountain system marking the great divide near Pretoria, the capital.

The country which no less than thirty years ago was literally black with roving herds of game, whose columns, when migrating, were often seen of the almost incredible length of sixty miles, is now, by dint of the industry and fierce valor of the Boers, subdued to the use of man. Roads intersect the country in every direction, important villages stud the land, churches and schools have been built and improvements made in the way of tree planting and the making of enclosures that are little less than marvelous, when we consider that the first colonists, after journeying in lands where no man was master and contentions with wild beasts and savage men extending over no less than forty years, arrived in their chosen country without property, tools, or machinery of any sort, armed only with manly virtues, their bibles and their never-failing rifles.

In the Transvaal the Boers are stock farmers, agriculturists and fruit growers. They have, as a rule, very large families. The children marry at early ages and the rule is patriarchal in the extreme. Hospitality is exercised everywhere; in fact, it is claimed by wayfarers as a right. The country is fairly wealthy, requiring only communication with the outside world to enable it to be a home for millions.

In speaking of the republics as a whole, it must be

remembered that their populations are, after all, but the overflow of the Boers of the Cape Colony, who, flying from British tyranny and misrule, overran first Natal and then the Orange Free State and the Transvaal. In the latter territory they number 85,000 and hold subject to their power no less than 800,000 Kafirs of various tribes who have sought shelter amongst the Dutch from inter-tribal wars.

The Transvaal "needs to be supplied," it is to be hoped from the United States, are artesians, implements of husbandry, metals, carriages, and plant of all sorts for rail and tram-ways, material for bridge construction, furniture, arms, and domestic utensils of all sorts, blankets, sheeting, clothes, and knicknacks of many kinds, waterproofs, saddlery, horse gear, manufactured leather, wire, beads, liquors, tinned goods, frame houses, drugs, and hundreds of other articles of use and necessity.

In return the Transvaal can give wool, ivory, hides, products of the chase, a little gold, cobalt, tin, copper, and coal for use of the shipping; coffee, sugar, arrowroot, tobacco, and various valuable gums, including crude indian rubber, with many medicinal plants and roots, rare woods, fruits, and flowers. Surely, with such a land as this, it would be of both immediate and prospective profit to traffic, and yet Delagoa bay is to-day a neglected port; although by the making from its unrivalled haven towards the interior of a single line of railway, the whole of the trade of Eastern South Africa lies open to the first comer.

The possibilities of such a trade are almost boundless, and now, especially when through the jealous and quarrelsome disposition of the British they have themselves totally lost their former profitable connection with Matabiland

and the lake country, is the most fitting time for the merchants and capitalists of the United States to open up for themselves, and secure to their country the profits to be derived from commerce with the interior of this too much neglected continent.

No South African port can compete with Delagoa bay as regards nearness to the interior, and besides this, all the English colonies maintain tariffs that are almost repressive, amounting to, on the average, 10 per cent. on the value of all goods landed; whilst the Transvaal has a treaty with Portugal by which imports will be only subjected to a nominal burden of $7 per 1,000 lbs. weight.

The Transvaal population, other than Boers pure and simple, consists of about 5,000 English-speaking men, women and children, dwelling in the villages, and a variety of broken tribes of Kafirs. These tribes are, however, a source of weakness and danger to the Republic, inasmuch as the wretched officials of the British colonies are continually intriguing with the barbarians to overthrow the republican government, in order that Her Majesty's Government may again be tempted to enter upon the path of annexation. In a very recent instance, to which I shall again refer later, that of Mapoch, a chief, located forty miles northeast from Middelburg, the same intriguers succeeded in bringing on a war, which, however, has terminated most gloriously for the Boers, who have slain the recalcitrant chief and vindicated their outraged authority.

The Zulus exercising, as they do and must, considerable influence upon the civilization and progress of the country, merit more than a passing observation. Those in contact with the Transvaal are divided into two classes. The Amaswazi and the Zulus of Zululand. These, however, come

of the same stock, speak similarly, and are equally brave, patient of hunger and fatigue, swift of foot, hopelessly sunk in paganism, polygamous, and of pleasant, nay even agreeable, features and manner. They are both Kafirs, as we have chosen to call them, but this descriptive term is one they do not acknowledge, and the word is one for which their language has no meaning.

A peculiarity of this race, who call themselves simply "Bantu," or men, is, that they are imitative to a high degree, but invent nothing. During all the years in which they have been traveling and dwelling in sight of the ocean they have not set or attempted to set one ship upon the waters. They have not made even a canoe to cross the mouths and estuaries of tidal rivers. To-day, if they would cross a deep river, they plunge, rank after rank, into the water, each following rank supporting itself by leaning on the shoulders of its leaders, and so on, until, swarming together like bees on a honeycomb and losing lives at a fearful rate, they literally bridge the deep with their bodies. For a great life-saving feat of this sort, Dabulamanzi, the most-thought-of chieftain next to the King Cetewayo, received his name, which means "water troubler" or conqueror.

A very queer instance of their imitativeness, and one never recorded until now, happened long ago, when they, in the early part of this century, first came in contact with white people. Chaka, the Zulu King, sent, in 1828 or thereabouts, a deputation to the colony of the Cape of Good Hope to solicit the friendship of the Governor. His messengers were seven in number, and proceeded in safety until they reached Port Elizabeth, where they were very improperly detained for a whole season whilst an absurd

correspondence about themselves and their mission went on between the British officials. At length the messengers were allowed to proceed. When they were at Capetown, after stating their business and delivering ivory and skins of a very valuable sort as presents from their master, they were given their answer and certain messages and presents in return. These gifts, however, were of but little value, and by no means suitable to the importance of the occasion or to the rank of King Chaka. They consisted of pieces of colored calico, blankets, looking-glasses, and beads, where they ought at least to have included arms and saddlery and a horse or some live animal. When the messengers, after an absence of very many months, reached Zululand, the King was very angry, and asserted plainly enough that they had failed to reach the representative of the English King, of whom he had heard many great things, but had been detained by petty officers, who had swindled him out of his valuable gifts, and sent him only some insignificant things in return. When the messengers were retiring from his presence he suddenly called to them, and ordered that they should make for him as a proof that they had seen all they told him of, and especially that they had visited Capetown, of whose grandeur he had conceived most exaggerated notions, some article the like of which he had not seen before. Should they not do this, they died at sunrise. He put them in charge of a guard, and left them to their own devices.

The unhappy ambassadors consulted as to what they had seen and what they could make. Their attention had been mightily drawn to the chairs in the entrance halls of the various houses they had been in, and especially of the Governor's mansion at Capetown, and a copy in wood of

one of these they determined to produce. But these poor barbarians had no knowledge of cabinet-making, nor had they any tools to aid them. They, in fact, knew no better than to whittle down with their spear heads a gigantic tree stump into a likeness of what they remembered. Undaunted by the difficulty of the labor, the worthlessness of their tools, and the hardness of the wood, these imitative savages set to at their tremendous task, and by morning they had actually carved out of the block a rude chair, with its rungs and scroll-work, ornamented carved back-pieces and all, gigantic, heavy and awkward, but a truthful rough likeness of the furniture they had seen. The King was impressed with the truth of their story, and the rude chair became his favorite seat or throne. It is now an object of very great curiosity at the Imperial Hotel, Pietermaritzburg, Natal, the proprietor of which, Mr. George Thresh, has been offered very large sums for it.

It is to be feared that neither the Zulus nor the Amaswazi are destined to make any very noteworthy advances in civilization, at least in our day. So far as missionary effort has as yet gone, these tribes are hopelessly pagan. The reason of this is partly because the British in their colony of Natal have not sought, as a people, to put down the custom of female slavery, upon which polygamy is based, and also because the missionaries in British South Africa pursue a course that cannot fail to alienate from themselves both the settlers and the savages.

The missionaries—and here I speak of American missions as well as those of other nations—delight to form locations, to live upon reserves and in especial pet localities, wherein they gather together those who pretend to accept their teaching. The lazy, the vicious, and the criminal, too often

for the sake of immunities to be enjoyed in those nursling places of a vicious parody on Christianity, flock on to the reservations; and runaway couples, people who have evaded the marriage laws of their tribe, take refuge with the "teachers." The men on mission stations rapidly learn to put on airs, to steal, lie, drink, and place a high value upon their services, should such come to be in demand. As a rule, they become only influential to corrupt the servants of neighboring farmers and to set up contentions, turbulence and sedition in their various neighborhoods. The women on mission stations too often fall into worse forms of degradation, it being notoriously the fact that whilst amongst the pagans immodesty is almost wholly unknown, vice in its most hateful forms pervades the church locations.

The result of all this can be guessed at. Respectable pagans will not associate with mission Kafirs, who are also despised, hated and suspected by the whites. The missionary, shut up amongst a sect, has no access to or influence with the colonists or with the great mass of the savages that dwell all over the country. He has voluntarily isolated himself, narrowed his own sphere of usefulness, and become himself a pariah instead of a pastor.

The wild Kafirs were known to have a knowledge of smelting and iron work at some past time; but this seems gradually to have been lost, and although spears of steel and rings of copper and brass of native manufacture are still to be found amongst the tribes, yet I cannot say that I know of one manufacturing native alive at the present day; and this, although evidences of recent work in the shape of rude forges and the like are not infrequently to be met with.

While I am upon this branch of the subject I ought to mention that occasional remains both of previous barbarisms and previous civilizations are often to be met with in the land now occupied by the Zulus and kindred tribes. At the Ityotyozi river, where the late unhappy Prince Imperial fell, on land lawfully the property of the Boers, who conquered it from Dingaan in 1842, are to be found by even the most unobservant seeker, flint instruments of various sorts and in various stages of preparation. A large quantity of such are in the hands of Colonel Bowker, of Durban. In the Lebomba mountains, close to the line of the Komati river, exists a brick culvert nearly one mile long, the use of which has as yet not even been guessed at, nor the date of its construction, whilst northwards, but still close to the coast, are many mounds, dwellings, and even raised forts, with burial-places, and remains of pottery, relics of a race of whom we know absolutely nothing.

The natives bordering on the Transvaal Boers on the extreme northeast, are, in addition to the Bapedi, of whom sufficient is known, chiefly Knobneusen and Mambeyers, mixed peoples of little intelligence, very savage, and amongst whom cannibalism has been frequent even of recent years. Between Sekukuni's old place and Middelburg, and well into the Transvaal, is the mountain so often alluded to in recent telegrams as Mapoch's country. This is a piece of territory on the Steelport river, averaging thirty-six miles long by ten in breadth. It was inhabited by a tribe of refugee Zulus under Mapoch, a chief who was *quasi* independent of the Boers, with whom, however, he always sided in their wars with Sekukuni. Mapoch died in 1877, and was succeeded by his general, Mabonk, as guardian of the heir to the tribal chieftainship. As is matter of his-

tory, Lord Wolseley, then Sir Garnet, destroyed Sekukuni's stronghold in 1879, and carried the chief into captivity in Pretoria. Sir Theophilus Shepstone's nominee and parasite, a fellow named Mampoor, was, in furtherance of British interests, made chief over the Bapedi in place of Sekukuni; but in the course of time, when the Boers wrested their country once more from the British, a joint undertaking was made that Mampoor should again give place to the true chief, who was liberated and sent back to his people. Some English settlers, who are discontented at the action of their government in restoring to the Boers their liberties, strove to stir up war and tumult all round the border, and incited by them, Mampoor, the pretender, fell upon Sekukuni and his little household and slew them. The Boers determined to punish this act of treachery, and sent a sheriff to put the law in force against the murderer, who took refuge in the Mapoch mountain. Incited by Englishmen, who live in the Transvaal but to betray its hospitality and intrigue against its safety, the Mapochers announced their intention to defend Mampoor: but they have been totally defeated and their country overrun, and this notwithstanding the untruths about Boer repulses put through the cable daily before the world by the tireless traitors and stirrers-up of strife that, pretendedly through loyalty to England, are incessantly creating native tumults and seditions upon our borders.

Similarly, it has been stated by untruthful South African correspondents at various times, both last year and the year before, that the Boers were defeated by Montsioa, by Montsiva, by Magato, who lives near Marabastadt, and by Mapoch, whilst the fact is they have subdued the tribe that sheltered Mampoor, the murderer, they have no quarrel

with Magato, and they as a people have nothing whatever to do with Montsivi alias Montsioa, against whom they have not sent a man or a gun, whilst poor Mapoch, who is supposed to have defeated them, is dead long since, and his people are subjugated.

I regret not having time or opportunity to deal more at length with the circumstances of these Kafir races, their war customs, domestic ways and undesigned flatteries of our noble selves, the white colonists. I must, however, say this, that a study of their arts, language and superstitions would prove interesting and valuable.

Neither will time admit of lengthy description of the other South African races. Their common peculiarity is, that although they must for years have dwelt near to and been living within sight of the ocean and in the middle of large timber forests, they never at any time invented or imitated a boat, and indeed never developed a taste for eating fish or fishing as a source for food supply. Many of their customs resemble those of the Jews. Jewish rites are practiced amongst them, and the male members of Bechuana tribes are very often buried with their feet towards the northeast, the land from whence they say they have come; and while the Kafirs of the Bantu or Zulu race are impracticable pagans, the Basutos and all the Bechuana tribes are accessible to the softening influences of trade, especially that in liquors. Many visitors in Africa noticing black men in the Cape colony who have submitted to civilization, are very prone to think them to be converted Kafirs. Therefore, I think it well to reiterate that the slaves of the Dutch in the Cape Colony from whom these clothed colored men are descended were not Kafirs, but imported negroes obtained in the way usual in slave-trading days, and liber-

ated during the mania for negro enfranchisement that swept over Great Britain between 1828 and 1834.

The Boers forbid polygamy. Native blacks within their borders must conform to laws of decency. In this the conduct of the Republics contrasts well with that of the government of the British colony of Natal, where females are an article of barter, and the sex is held in a condition of the most degrading bondage, being a chattel whose female children may be sold away and in time become slaves at the will of the male parent, who is truly nothing more than a legally enfranchised and protected slaveholding polygamist.

Only those natives and colored persons who become servants of the Dutch and receive civilization at their hands turn out reputable or even decent converts and members of society. English forms of civilization and contact with British colonists have failed to produce any noteworthy beneficial influence on the people of the less cultured races. Even the friendship of the tribes in contact with the British has failed that government in its hour of need. There is scarcely a tribe within striking distance of them, with whom they have not warred within the past seven years. In at least one instance the British colonists, with the resources of the Empire behind them, have been wholly defeated by almost naked savages, whose total field force did not exceed 10,000 men. I allude to the Basuto war, which is still smouldering, and in consequence of which the Cape has deemed it fitting to retire from the possession of a fine province annexed by Sir Philip Wodehouse in 1868.

The Transvaal contains, besides the plains I have described, vast extents of broken and forest country, and the scenery in many parts of the more mountainous regions

combines sublimity with a rare form of beauty. In the country lying immediately west of the Drakensberg are to be found, especially in New Scotland and Lydenburg, oak trees that remind one of the old-fashioned woods of Europe. In some places the country resembles successions of natural parks, and ferns and plants similar to those of Wicklow in Ireland and Wales in England reward the toil of the searcher for botanical treasures. The locust is almost unknown, save in the extreme west of the country; but a caterpillar, known as the "risper," appears occasionally as a plague, destroying the natural grasses and some of the crops. A very severe form of epizootic—horse sickness—is also prevalent in low-lying farms; but, taken as a whole, both country and climate are admirable. Hydrophobia, sunstroke and cholera are wholly unknown.

The reptiles of the country are, though fairly plentiful, not dangerous nor even notably unpleasant and discomforting. It is only in the coast lands, and especially in Natal, that the fatal imamba, the most deadly of African snakes, is to be met with. In fact, I have not during fourteen years' residence in the country generally, heard a well authenticated case of a European, or person of European descent, being killed by either snake or serpent. There are no dangerous saurians in the rivers, lakes or pools, and, excepting two hunters, no one has been killed by wild beasts for years. The lions, with the game they fed on, are now no longer to be found within the occupied parts of the country.

Of the Boers themselves I can only speak in terms of almost ardent praise; but it must be remembered that in the midst of their simplicity is still to be found a taint of cunning and suspicion, caused by the undeserved persecutions

they have undergone. They are shrewd, sagacious and thrifty, but not ambitious nor emulous to imitate our ways. Their virtues are their own, their reverence for order great, their contempt of mere law an inborn instinct. They are attached, in a rude, genuine fashion, to the religion of their fathers, and in many cases strive to make of the Bible a rule of life; and yet they are in no sense priest-ridden or dominated over by their clergy, as was proved during their late trouble with England, when nearly all the ministers of the Dutch Reformed Church in the Transvaal were driven from their livings, because, like true mammon-worshippers, they strove to uphold English rule, and sought rather to betray than to aid in the struggle for liberty.

An instance of the genuineness of the Boer religious spirit, and one of the most unmistakable sort, was furnished after the fall of General Sir George Colley at Majuba, on the 27th of February, 1881. The British were at 4 P. M. mobbed; hussars and infantry, fugitives of all ranks, rushing from the battlefield. This was in the valley at the foot of the mountain, from which the main body had been pushed at 1 o'clock. The English guns had been turned, through some fatality, on their own flying column, when General Smith, the Boer leader, at that point suddenly ordered his victorious troopers to cease firing. "Shoot no more; you must not shoot more," he shouted along his whole front. "To-day is Sunday, and blood enough has been shed." This is true, strictly and literally true; and it is to the religious scrupulosity and exaggerated humanity of the Boer officers and men that the British soldiers who got away on that day may attribute their preservation from death. If we had been turned, I do not think any scruple of conscience on the part of the British

would have arisen to check the pursuit or even to stay the hand of massacre.

Of Boer craft and superstition I know an odd instance. During a former war with the Basutos, the President found great difficulty in keeping his field force together. Victories had been won, but their fruits had not yet been fully reaped, for the beaten Basutos kept close in the caves and gorges of their mountains, or from their terraces and summits maintained a desultory warfare against the invaders. The season was unpropitious. It was the opening of the year—rainy, damp, unwholesome weather—and the farmers were anxious to get home to attend to their own ploughing and cropping. The President saw plainly enough, on the other hand, that it was necessary to keep the enemy from cultivating their fields. If they could be kept in the mountains and cut off from their fertile valleys for one whole season, they must surrender at discretion. This was explained to the Boer "commando," as a field force is there called, but the men would not listen. They held tumultuous meetings and began to prepare to quit the field. The President, in his turn, called a general meeting, and thereat he told the malcontents that it was, in his opinion, a sort of flying in the face of God to leave the field, when a few months of persistent self-sacrifice would give them a complete victory. However, he would, if they so wished it, refer the matter straight to the arbitrament of Heaven by the drawing of lots, in accordance with ancient practice. The lot should decide whether they should go or stay; should prosecute the war throughout the spring and summer, or abandon it, with the certainty of having to renew it year after year, under perhaps less favorable circumstances.

Then he threw, after writing upon them, upon the floor

XUM

of the Council tent two rolled-up pellets of paper, saying, "There are the lots, by them let us be guided. Let the oldest man here pick up which he will and read it out. I for one shall accept the decision." An old man went forward and picked up one of the lots, on which was decreed, "To REMAIN AND FINISH THE WAR." The Boers now gave in, and with the utmost cheerfulness accepted the decision which they no doubt believed was that of God. They did not know, however, that on the other lot, which the President himself picked up and secreted in the tumult, were exactly the same words, so that it did not matter which lot was drawn, the result was foreordained and prearranged, not by Heaven's hand, but by John Brand's cunning.

The life led by the Boer is one of humble simplicity. Early rising, family prayers, visits to the corrals, labor, more or less irregular in the gardens, tobacco culture and manufacture, smoking, hunting and coffee drinking, are the occupations of nearly every day; but occasionally when surplus crops have to be sold, or clothing provided, or church visited, or perhaps some large transaction (the purchase of new stock or a larger farm undertaken), then the towns are visited, the Boer, if pressed for time, traveling on horseback, but if with his wife and family, in wagonettes or buggies. In the way of wheeled vehicles the Boers, as a people, are well off. They use very many carriages of American make, and their horses are active, suited to the country, easily fed and kept in condition, and quite as hardy and enduring as Indian ponies. Where produce has to be carried, resort is usually had to the cumbrous ox-wagon built in the country, and for which no efficient imported substitute has as yet been found.

Boerland is the paradise of women, and this notwith-

standing the fact that the fashions are not matter of imperative observation there. The Boer housewife, although her dress may be modelled on that of her great-grandmother, and her cap may be of some form that was ancient a hundred years ago, is upon the farm and within the house the head of the family. Her chair, not the old man's, is sacred and free from all intrusion. Her corner by the bright shining brass coffee kettle is "tabu" to all youngsters and strangers. No deal or purchase takes place in which she is not consulted; she has separate property rights from her husband, and her children, from the very hour of their birth, can hold chattel property, flocks and herds, horses and furniture, in their own right. And the Boer women are good women. I have seen them in peace and in war, amongst the wounded and the dying, as well as at a New Year's merrymaking, yet ever without reproach, doing their duties or enjoying their pleasures in such a way as to uphold the credit of their sex and the great race they sprang from.

A great deal of the work of the Boer farms is done by the younger children, who, on their ponies, watch over the cattle and flocks, visit the servants at their labors and exercise a steady, ceaseless supervision over all. Education is mainly imparted at home. The rudiments are picked up from itinerant teachers or tutors, who stay for a few months at a time at each large farm. In the Transvaal villages and towns there are national schools, supported by the State, but the education imparted is not of the very highest sort. It is, however, good of its kind and obligatory on children, inasmuch as they cannot get married until they are church members, and church membership infers

at least a fair rudimentary education, without which confirmation need not be sought.

Amongst the younger ladies, courtship and marriage are looked forward to as the spice of life, but the courtships are of the shortest and very unromantic. The usual age for marrying is from fifteen to eighteen, and one visit, or at most two, to the fair one's house is enough to fix the fate of any enamored swain. There is one feature of the relationship between parents and their children that appears to be peculiar to South Africa: Parents cannot prevent their children from contracting marriages of choice. The district magistrate is the legal guardian of the rights of minors, and, by public notice on the door of the court-house, marriage may be demanded by lovers, unless not mercenary reasons but good cause be shown to the contrary. I know one case of the sort where a father and mother permitted a young man's addresses to be paid to their daughter, but through whimsical objection to his poverty, objected to the marriage, refusing the fellow as a son-in-law, although they accepted him as a fitting friend for their daughter. The young people objected to the treatment, and the Landdrost, to whom the facts of the intimacy were patent, ordered the match to be completed.

The only fault to be found with the Boer girls is one that is half an amiable one, resulting, as it does, from the very close family friendships peculiar to people leading lives of danger and isolation. The Boer girl, if she can, will marry a friend of her family, a cousin even, rather than a stranger; and if she does marry out of the family, or with one of foreign race, her thoughts are always with her own people, and down in the depths of her heart she nourishes a lurking fear of her strange lord and master. She will

therefore cling to her mother's people, in some cases to the injury and discomfort of her husband, whom she in fact considers as an accession to HER side of the house.

One consequence of this is that in some places it is customary for the young married couple to live for a time in the house of or on the farm of the bride's parents. Hence the total subjugation of the male to his wife and mother-in-law.

The Boers are very domesticated and have a fondness for music. It is rare to see a house, however small, where there is not a harmonium or a piano, and now that the products of the outer world are, by reason of rapid transit and the opening up of the whole country to trade consequent on the discovery of diamonds, very easily obtainable, constant improvements in dress and in the furnishing of their homes are noticeable even amongst the poorest of the farmers. The only real disability in the way of trade from which they suffer is through having to obtain supplies through the overtaxed harbor of Port Natal, a colony that from its position is enabled to play the part of toll-gate to much of South Africa. Durban has a shallow harbor, of great size and beauty, it is true, but rapidly silting up with sand brought down by the Mozambique channel current. A bar over which ordinarily there is to be found but eleven feet of water forms a danger and sometimes causes delay in unloading to shipping, whilst on land a one-horse railway, narrow gauge, and constructed with the most reckless disregard of public interests, acts as a barrier against instead of a channel for trade. Natal also is jealous of Boer prosperity, and is, for some mysterious and wholly inexplicable reason, fanatically loyal to England. To so wild an extent does this sort of rampant toryism run in

that colony, that not long since Mr. Griffin, a member of the Legislature, proposed to put prohibitory taxes against imports of carriages and machinery from America, for, said he, "we are English, and an English colony should support only English trade." There are good people in Natal, hospitable men and fair and virtuous women; but unhappily the rapacious spirit of trade has fastened upon some few of the more influential inhabitants of the principal towns, and a spirit of snobbery, a sort of Anglomania, has corrupted the minds of their children. But for the existence of this wretched spirit, Natal, like Boerland, would to-day be a prosperous, free and happy territory.

A peculiarity of Boerland is the absence of fires in the houses. The people enjoy few winter comforts, and stoves and steam-heaters are unknown luxuries. The climate is moderate, averaging about 58 degrees Fahrenheit throughout the entire year, rising to 95 degrees in Summer, but often falling to 15 degrees or 20 degrees below freezing at night in winter upon the plains.

In the way of property the Boers may be said to be well off as a people. Wealth is very fairly divided. There are but few poor people to be met with, and the conditions of life are easy. Sheep thrive well nearly everywhere in Boerland, and, as a class of stock, tend to increase in value yearly, their wool becoming finer and more valuable as acclimatation becomes more perfect. Sheep, as flesh producers, have increased in value, within the past ten years, more than 50 per cent., and lambs sell freely at remunerative prices, as do all sorts of imported blood stock.

The Boers, earning more than they expend, have a tendency to absorb gold; and silver likewise has a tendency to disappear amongst the native tribes, who are usually paid in

that metal; but of late there have been established some sound financial institutions in the Orange Free State, and these will tend to bring capital, at present hoarded, into circulation.

One thing you can always calculate upon in Boerland, and that is, a hospitable and warm-hearted reception. This, however, is not always extended to tramps or "bundle draggers," as knights of the blanket and gripsack are called in South Africa. Respectability of appearance goes a long way with the Boer, and indeed secures a welcome everywhere in South Africa. A British officer recently met with great kindness in a most unexpected way at a house where the people spoke only Dutch and did not understand a word their visitor said. He told me of it and asked me to find out to what he must attribute this favor shown him. I asked the old Boer about a year after why it was so? "Oh," said Mynheer, "I saw at once he was a gentleman. He had a double-barreled shot-gun and two pointer dogs, and these are a sufficient certificate of respectability wherever there are partridges to shoot or quails to hunt up for the gun." And I am not so sure that the honest sportsman's instinct of the Boer did not guide him aright.

One word more about the people. The Boers, as I have said before, are a Calvinistic Protestant race, descended from Dutch and French Huguenot settlers, who fled to Africa to escape from European intolerance. These people, on the seizure of the Colony of the Cape of Good Hope in 1806, by Great Britain, found themselves transferred with the soil, and subjected to a power whose every act was an insult, every law an aggression or a robbery. They numbered in all, when the Cape was ceded to England, but 26,000, but to-day their arms have conquered South Africa; they

are to be met with from Capetown almost to the Zambezi, and their numbers, within and without the republics, have increased to little less than 500,000.

They are still, as they were when they flung themselves into the wild places of the earth in search of freedom, a brave, simple, hospitable and God-fearing people; superstitious, it is true, but never brutal; mild in peace, forgiving of insult, terrible when provoked to wrath, but yet of such quiet and inoffensive manners, that by the degraded caricaturists of Capetown they are looked upon as cowardly and unwarlike.

They have been the pioneers, the vine-planters and tree-growers of the land. Their only desire is to live at peace, and, as far as possible, unmolested by law and lawyers. They look with very justifiable suspicion on an excess of law-making, and are, in fact, a people loving and desiring to enjoy personal liberty.

I trust that what I have said of this country and its people will induce men of influence in this great republic to invest some of their capital in trading enterprises in such a way as to bring these deserving, rising, prosperous men into the family of nations, from which the jealousies and intrigues of England seek to exclude them; and this although they have paid in blood the price of national independence.

THE ORIGIN OF THE NAME OF AMERICA.

From the National History of the Peruvians.

BY

MR. T. H. LAMBERT.

It has always been my pleasure to assist science, and to spread knowledge, in my humble way. Therefore, I have accepted "*con amore*" the invitation of this Society, to come here this evening, and to communicate the result of my researches, to find the origin of the name of America, which I have given much attention to, during my stay on this side of the Atlantic, as it forms one of the points in a work which I have completed, in order to show that the pre-historic communication between the aborigines of the two hemispheres, was much more intimate, than is generally known.

In taking a geographical view of the western half of the earth, I will begin by reminding you of its position as a planet, in one of the innumerable systems of star clusters which form the universe, being 1,252,000 times smaller than the sun—a star of the sixth magnitude—which is 2,700 times less than the star Sirius. But the world is not so very inconsiderable after all, for its weight is six hundred trillions of tons, and the dry lands, which are only one-fourth of its area, contain 51,000,000 of square miles, of which Asia is the largest division, then America, and then Africa, where the desert of Sahara is larger than Europe, the smallest and most important of the four geographical quarters.

The North American Continent represents 7,400,000 of square miles, while there is 6,500,000 in the South; and it has been calculated, that 4,000,000 of it is capable of supporting 200 persons per mile, or 800,000,000 of people, and about 6,000,000, each of which would sustain 490 persons per mile, or 2,940 millions. So that 3,740 millions of people might live comfortably on the Western Continent, or nearly three times the present population of the earth, which is estimated at 1,456 millions of souls—or of mouths, to use the Chinese term—who live in temperatures, varying from the heat of Senegal, which is sufficient to boil spirits, to the cold of the northeast of Asia, where mercury becomes solid and malleable. This population is divided into 840,000,000 of Asiatic people, 316,000,000 of Europeans, 205,000,000 of Africans, and only 95,000,000 in America, which was the name of the country of its chief nation, and I think that I will give sufficient reason, for arriving at the conclusion, that the name of the Western hemisphere has emanated from that source. It is a curious coincidence, that the names of China and America, the two countries guarding the Pacific, appear in history for ages before the days of the men who are supposed to have christened them. China, is said to bear the name of the Tsin dynasty of 200 B. C., and America of Vespucci.

When one finds 840 millions of people, living on the 17 millions of square miles of Asiatic land, 205 millions, on the 11½ millions of African soil, 316 millions, on the 3½ millions of European territory, and only 95 millions on the 15 millions of square miles of the Western hemisphere, which is capable of supporting 3,740 millions of people, it cannot be doubted that America has a future.

A continent like this, with its nominal population and

immense territorial wealth, lying waste for want of labor, will continue to attract the working classes of other nations, and these, by turning the worthless prairie lands into cities of wealth, would bring prosperity to any land, at least, as a financial success, even under any form of government.

The ancient history of America ought to be well known, especially in these United States, which represent the lion's share; and if they continue to increase in extent and number as they have done, there is no doubt that some day or other, the stars and stripes will float over a territory, and be supported by a population, as large as that which salutes the Union Jack. When I say this, I say something for a new nation, as the British flag represents 250,000,000 of people, and over 600,000 square miles of land more than the entire North American continent, while the population of the capital is 1-364th that of the world, and double the number of the Kingdom of Denmark. This ought to make one anxious to learn much about the America of the days of the Spanish discoverers.

Unfortunately, its chief histories have nearly all been lost, and its traditions are unfairly doubted, but monuments remain which are beyond question.

I will divide my argument into five sections, which I shall take in the following order:

1. The civilization of the chief aborigines of the Western hemisphere.

2. The evidence that America was the national name of their empire.

3. That this name was known to the Spaniards, who adopted it.

4. An explanation of the supposition that America was named after Vespucci.

5. The etymology of the name.

It may be fairly asked, how it is possible to believe that a nation had arrived at an advanced state of civilization, who sold entire kingdoms for a few shillings, and who permitted a handful of emigrants to take possession of half of the earth ?

This question may appear unanswerable without reflection, but a recollection of native history will suggest an explanation which is perfectly satisfactory.

The colonists believed that they had bought Long Island for 30*s*., and Staten Island for 24*s*., or something of that sort ; but the Indian traditions relate that they received the Europeans as visitors, who had given them presents.

These traditions were not simply a *viva voce*. They were often well-kept, as in the instance of the ancestors of the Iroquois (the Lenni Lenappes), whose painted wooden tablets date from 1600 B. C.

There are two good reasons why Europeans were at first well received. The universal idea of the "Great Spirit" in America, and in fact everywhere, was that of whiteness and brightness like the sun, which was taken as the emblem of God. When Cortes landed in Mexico, Montezuma (the last of the native sovereigns), believing, from his complexion, that he was a descendant of Quetzalcohuatl, sent him the ornaments of that god ; while in Peru, Atahualpa (the last of the Incas), told his people that the Spaniards were the descendants of Manco Capac, and many Indian nations worshipped the missionaries on first seeing them. The aboriginies of America were the people of a bygone age—a past era—and, as if repeating the history of all the other nations who rose and fell, who came and went, they bowed to the decree of Providence, and passed into the realms of

Nox; but not without leaving monuments which are worthy of the great nations of their day.

It was the Baron von Humboldt who first told the world of the antiquities of Central America—the Egypt of the Western Hemisphere—and in consequence of further discoveries made by Spanish adventurers, toward the middle of the last century, their government sent explorers, who gave further sketches and descriptions of its ruins, which have proved that the natives were not the wild, savage people at first supposed.

The Mexicans made walls of hewn stone, which were admirably put together with mortar, enriched by sculpture in *alto relievo*, and with hieroglyphic inscriptions exactly resembling the Mexican MSS. in the museums of Europe and in Humboldt's works. They built well-executed and vaulted roofs, and made obelisks, which they covered with mythic inscriptions. Their large temples and palaces were ornamented with stucco, and gaily painted in red, yellow and black. At Copan, in Honduras, which is near the frontier of Guatemala, the chief building took 26,000,000 of cubic feet of stone. It is an immense terrace with a perpendicular front towards the river, which is 624 feet long and 70 feet high, while one of the pyramids has an altitude of 150 feet. These ruins occupy a rectangular area of about 1600 feet by 900, of which the outer walls are 25 feet thick at the ground. There are also numerous other obelisks and statues, all of which are unprotected from the ravages of the weather or the people.

At Uxmal, in Yucatan, magnificent ruins of the same sort exist. The chief building is an immense and beautiful pyramid, in three stages or terraces, faced with hewn stone, and neatly rounded at the angles. The first terrace is 575

feet long, 15 feet broad, and 3 feet high. Then comes another, 545 feet by 250 by 20, while the third is 360 feet by 30 by 19. From the centre of the second terrace a vast flight of well made steps led to a temple, with a facade of no less than 322 feet by 25. The upper part was ornamented with rich sculpture, and its flat roof was covered with hard cement, while a court in a building on a lower level took 43,660 *carved* stones to pave. Then the ruins of Chicken, also in Yucatan, extend over an area of two miles in circumference, with roofs of stone arches. Among these are two parallel stone walls, 274 feet by 30 and 30 feet apart, while one of the temples was 480 yards at its base and 55 feet high. These cities had abundance of good water from wells and cisterns of excellent construction. On Cortes' arrival, the Mexican Empire embraced 130,000 square miles. They had a more perfect calendar than the Greeks and Romans. Their civil year, of 360 days, was divided into 18 months, each of 4 weeks, while 5 days was a week. At the end of the year they added a week to make 365 days, and as the earth takes 5 hours, 49 minutes, and 46 seconds in excess of 365 days to make the circle of the sun, they added 13 days at the end of their cycle of 52 years, being an extra day in every four years, and therefore exactly similiar to the bissextile year; so that the modern system is only superior to that of the ancient Mexicans by the metemptosis, or omission of the 29th of February once in every 134 years, in order to equalize the excess of time created by that innovation. The Mexicans cultivated the land, grew, spun, and weaved cotton, made utensils of gold, silver and copper, as well as many beautiful ornaments. Their books were written on aloe leaves, cotton-cloth and dressed deer skins. The Government kept couriers to

convey intelligence to all parts of the state, while the Capitol was watched and cleaned by a sort of police establishment.

There was yet another nation whose civilization far exceeded these. That was Peru, the Sirius of native American splendor. They had a sea coast of 2,500 miles, from Pastos to the River Maule, and 500 miles wide, while the dominion of the Incas extended from the equator to latitude 35° S., or as far as Buenos Ayres, and from the Atlantic to the Pacific. Their tongue, the Quicha, was in five dialects, spoken in Peru proper, in Quito, New Granada, and in part of La Plata, and it is has been authentically said that one-half of the American nations are of Quicha descent.

One of their roads from Cuzo to Quito was 1,500 miles long and about 40 feet wide, paved with stone and earth, upturned from the ground, made perfectly level, with solid masonry over the marshes, and houses at proper distances for the Inca or his messengers. Their suspension bridges were similar to the modern system. Humboldt passed over one of these 120 feet long, and another traveller crossed one, 225 feet, over which loaded animals might have passed. They had hard chisels, made of copper mixed with 6 per cent. of tin, and Humboldt said that they hewed stone as well as the Romans did, which was so artistically joined in building, that the line dividing the blocks was hardly visible. They also grew cotton, spun, and weaved, made pottery, refined silver ore, and manufactured bronze. It has been proved that the civilization of Peru came from China, where gunpowder, printing, the compass, and suspension bridges, were used for ages before they were known in Europe.

I hope that I have now succeeded in recalling to you the

great monuments of Central America, or at least their description, of which one author has made a work of four volumes. I will now remind you of the sacred history of its chief nation, the Peruvians, or properly the Quichas. I think that Americans, like many people, often know more of other countries than they do of their own, like the Romans, who taught their children Greek first and then Latin afterwards. I have no doubt in these æsthetic days, that many of the learned members of this society, instead of reading the "Popol Vuh," have spent time in studying the "*Shi*," because the "*Shi King*," the book of ancient Chinese poems, is the most celebrated poetical work in the world, and therefore it is more attractive than the "Popol Vuh," which means "sacred book," and is, apparently, the original of the Teo-Amoxtli, of the Toltecas, from whom the Quichas or Peruvians claim descent, as well as the Mexicans or Nahuas.

The originality of the "Popol Vuh" has been questioned, because its history resembles the Bible; but there are so many other proofs of connection between the two hemispheres, that this ought to be a point in its favor. I only refer to it as supplementary evidence in my argument; but I think that there are sufficient concurrent circumstances to prove its authenticity. The *genus homo* has always been more or less skeptical. Americans would not have believed a few years ago, that they read Sanscrit and wrote in Egyptian, every day; but it is now known, that the alphabet has come from Egypt, and that the numerals 1 to 9, are simply the initial letters of the Sanscrit name for each figure.

Tulan is said to have been the chief country of the ancient Mexicans, which some authorities suppose was

near Palenca, the name given to the principal ruins of Central America, which some Spaniards had discovered during the middle of last century, when they called them Palenca, as that was the name of the nearest village. These ruins of forty-four towns, covering about twenty-eight miles, were so well hidden by a dense forest, that people living only a few miles away, had never heard of them. The "Popol Vuh" states, that a revolt against the kingdom of Xibalba —which was anterior to that of the Toltecas—ended in the foundation of the empire of the Quicha race. The substance of the argument is, that during the reign of Hun Camé and Vukub Camé, the two kings of Xibalba, Hunhun Ahpu and Vukub Hun Ahpu, two Mexican princes, were executed on a charge of creating a revolt in that kingdom. The head of Hunhun Ahpu was placed on a dead tree, as a monument of their punishment, but the tree immediately returned to life and bore fruit. The kings forbade any one to touch it, but Ixquic, the daughter of a Xibalbian Prince, strangely enough for one of the fair sex, is prompted by curiosity, to go and take some of the forbidden fruit. On approaching the tree, the voice of Hunhun Ahpu warns her, and, asking her desire, he commands that she extend her arms, when he places sacred saliva on her hand, which immediately disappears, producing a certain effect. Ixquic returns home; is accused by her father; she pleads innocence, but is condemned to death by the Court. Then, aided by the executioners, she escapes the penalty, and goes to the mother of Hunhun Ahpu, by whom she is received as a daughter-in-law, remaining there until the birth of the twins, Hun Ahpu and Xbalenca, who go to Xibalba and perform many wonders, killing and restoring themselves to life. The Kings of Xibalba command that they repeat this

with them, whereon they kill their majesties, but do not restore them. Then they tell the people, that they are the sons of one of the heroes executed by these kings, and that they have thus avenged their father. They then retire to Utlatlan, the seat of the common people, declare war, defeat Xibalba, and form an empire, making Utlatlan the capital, but changing its name to *Amarca* before doing so. The old Spaniards wrote this name Gumarcaah, but there is no G, in Quicha, and they pronounced this letter as H, which the Spaniards also often did, as in the word general, which they pronounce heneral, and when they knew the name more perfectly they wrote it as Amarca, which I will show is identical with the modern name of America. Amarca then became the most famous name in the Western hemisphere. When the Spaniards took Peru, they made Caj-Amarca, their headquarters. There they found the Inca; it was their sacred necropolis, and they soon convinced him of this for the last time by sending him to the "happy hunting-grounds." The word "Caj" means frost, probably as Caj-Amarca was on an elevation. Near it was Pult-Amarca, where there are sulphur springs, which are still called Baños del Inca by the Spaniards. Yan-Amarca, was their Hercules. Yanhal is the verb, to be, of which Yan, is the present indicative, meaning "there is," or behold. "*Behold Amarca.*" And well might this be the name of the Peruvian Hercules. Vin-Amarca was in the gulph where Mauco Capac, the Prince of Peruvian legislators and first Inca, received his divine vocation. Then there were the cities of Ang-Amarca, Uria-Amarca and Chenpi-Amarca, while towards the Atlantic side of the continent lay Cundin-Amarca. The Muyscas, or properly the Chibchas—Muysca meaning man—who are one of the

five chief nations of America, call their ancestors the people of Cundin-Amarca. Here is the American garden of Eden, and the only one of all the native names, which was called the Capitol:—"*Pa-tinamit Amarca*," or the Capitol Amarca, being the form under which it appears in their most ancient documents. The name is probably also in that of the Ameriscoggins, who were one of the chief tribes of the Ouragies, or Eries, the termination "ggin" being apparently similar to that in the name of Algon*quin*, the colonial pronunciation of Algewis, and many others.

As to the change from Amarca to America, philolgy explains, that words were first roots. Then came the second stage, where roots were joined, to express several ideas at once. The name of Amarca is in this form, as Am-ar-ca. The root ar, is in three forms: *ar*, primary; *er*, secondary; and *or*, a tertiary state; so that the names Am-*ar*-ca and Am-*eri*-ca are therefore identical. As an illustration of the variations in national names, I will repeat an explanation of the name of Japan, which I learned from a Japanese student of much erudition. The native name was Nietsi (sun) Honno (origin), or Nietsihonno, which became Niehon, its present form; but the sign which represented Niehon was pronounced Yapon, in China. Then the Dutch represented this sound by the letters, J-a-p-a-n; but when they read the Dutch news about Japan in England, they never thought of pronouncing it Yapon, so that Nietsi Honno grew into Japan. In the same way the Celts were called Keltai in Greece, Galli in Rome, Goidel by themselves; and when the letter C, (invented by the Romans in the first century,) began to take the place of K, the name Kelt, became Celt.

I have now endeavored to give a *coup d'œil* of the state

of civilization, the great monuments and national history of America, when the voyage of Columbus was undertaken, to find a Western passage to India, to discover the country of Cipango (Japan), and to convert the grand Khan, to whom he had a letter of introduction, from their most Catholic majesties.

The Khans, in those days, had the Christian world more than once in fear and trembling, and it was at their request that one of the Popes sent ambassadors loaded with presents to, implore the grand Khan not to attack Europe. The fact that the Western hemisphere became known to Europe by the national name of its chief nation, who governed that part which was first known to the discoverers of America, is sufficient evidence that the first Spanish explorers knew of and adopted it, as there is not—as far as I have been able to find—any evidence to the contrary. It was impossible that they could not have known it. On the first voyage of Columbus, he remained three months in America. On the second voyage, sixteen months. On the third voyage, he visited the mainland, and spent seventeen months. On the fourth voyage, two years and four months, or five years and four months in all, during a period of twelve years. He made Haiti his headquarters, where they believed that Amanocon (gu-amanocon, with the customary prefix "gu") was the Supreme Ruler of all, while the native name of Ham-ah-e-ca, which sound is represented by the word Jamaica, pronounced in Spanish, Ham-ah-e-ca, was only thirteen miles from Haiti, and closely resembles the name of Am-ar-ca, which was written Ham-ar-caah, by the early Spaniards. In Trinidad, where he first saw the mainland, one of their chief gods was Amarocon (gu-Amarocon), living in the sun. Here Raleigh was

told of the treasures of Cun-din-*Amarca*, and of the valley of Amariocopana—pan or pana, meaning district or country—here were the Chagua Ramas Indians, who lived also on the mainland not far from Trinidad, and worked the gold mines of the America mountains along with the Carcas Indians, which name recalls Charchah, the place where the Princes met, whose death resulted in the formation of the empire of Amarca, while Gumilla, a chief of the Orenoco missions, in 1721, used *Chagua*, to translate the meaning of Manoa, which was said to have been the capitol of Cundin-Amarca, thus connecting the Chaguas of Trinidad with that place. The same races lived on the mainland and in the islands, while it is well known that all the Indians, preserve their ancient traditions most religiously. Nine Indians went to Spain on the first voyage, and five shiploads afterwards. These must have repeated histories of home, while Omeycon was the terrestrial paradise of the Mexicans.

The native stories of the treasures of Cundin-Amarca, must have made that name famous among those who knew the secret. In 1534 three expeditions met there accidentally, the first under the Spanish Governor of Popayan, the second commanded by Quisada, who marched across the Andes from Quito on the Pacific, and the third, led by the German, Federmann ; but none of them found the treasure, yet so intense was the excitement created, that Quisada continued to send expedition after expedition for years, and Spain spent more than all the millions which the new possessions had given her, while Spanish adventurers poured incessantly into the Orenoco. In May, 1499, Ojeda sailed, with Vespucci as passenger; in June, Nino sailed—he was a companion of Columbus ; in December, Pinzon

sailed—another companion; in 1500, Lepe; 1501, Guerra; and from this time there were continual expeditions under way. By this means the name Amarca became well known, but the capitol, Amarca, was burned by the Spaniard, Alvarado, in 1524.

I regret to say that I have been unable to find any reason for the statement of historians, that the Western Continent was named after Amerigo Vespucci, or, in other words, that it was not known abroad by its national name, but because a commercial traveller, whose Christian name is supposed to have been similar, had visited it, so that the country receives, not his family name, according to the common custom, but a name applying equally to many others, without indicating any one especially. Such a proposition is unreasonable, even if it were supported by the strongest evidence.

Why did not Vespucci claim the honor of naming the new land, or receive authority to do so, which was actually necessary, as he did not discover it? Why is he frequently or generally called Alberticus, if Amerigo were his original name?

Columbus or his friends would have objected, as he was the first discoverer and joint proprietor of the new lands, by right of his agreement with the Crown. The proud Castilian would never have permitted a foreigner, (an Italian trader,) to name this Spanish triumph, discovered by another, and by means of the money borrowed on the diamonds of the Crown, whose inscription: "To Castile and Leon, Columbus gave a new world," emblazoned on his tomb, speaks for itself, as well as the subsequent care which was taken of his remains. He died at Validolid, in Spain, on the 20th of May, 1506. Later on, his remains were

removed to Seville. In 1536 they were transferred to the island of St. Domingo, and in 1795-6, when that island was ceded to France, they were taken to the Cathedral of Havanah, where they now rest.

Nearly all the Spanish discoveries in America received Spanish or sacred names; but few of them survived, and the countries continued to be known by their national names. They called Central America, New Spain; Haiti they named Hispañiola, or Little Spain; and the Caribbean Sea, Northern Sea or Mare del Norte. Then the first name under which the Western Continent appeared on a map was, "Terra Sanctæ Crucis," or "Land of the Holy Cross," which soon disappeared, while its native name is that by which it is to-day known.

I have not only been unable to find a particle of evidence in support of the present explanation of the name of America, but it is not even in unison with a single circumstance in connection with it; while history, the customs of that age, and probability, all agree in pointing unmistakably to an explanation of the error.

Columbus sailed to find a Western passage to India, and when he found America, he believed that he had accomplished his object. He called these discoveries the West Indies, and he never changed his opinion.

Vespucci followed as a passenger to America; he was not a sailor, but a shrewd business man, and his business was to get all the information he could, and to make money out of it. He did this, and he published works on the Newfoundland, which made his name famous in Europe. It was the invariable custom of that age for men to receive a cognomen in connection with any remarkable deed. The learned monk Waltzemüller, who speaks of

Vespucci in his geographical works, wrote under the name of Hylacomylas. Bienwitz, who made the first map on which the name America appeared, was known as Apianus. A king of France was called "Louis d'outre mer," because he had crossed the sea, and the historian Cosmos, was named Indopleustis, as he had travelled in a land known as India. History is full of similar instances.

The voyage for Columbus was only the ordinary routine of life; but in those days, for Vespucci, a landsman, it was marvellous, and while Columbus went to sea and sailed again and again for India, as he thought, Vespucci remained on land, wrote works, and told stories far and near, of his wondrous voyage, of the country, and the people. I have proved that the name of Amarca or America, was the very foundation of the sacred history of the people whom he met in the Newfoundland, the people who told them all, of the treasures of Cundin-Amarca, while history shows that the Spaniards knew this name, and consequently, following the custom of the age, they ought to have called him the American Vespucci, otherwise I cannot account for the fact, that his name appears so often in history as Alberticus. He seems to have adopted the name of Amerigo, and knew of the treasures of Cundin-Amarca, afterwards called "the Golden City," or El dorado, by the Spaniards, which the Crown had resolved to spend millions to find. He kept the secret, and they appointed him "Piloto mayor de la casa de contratacion," a sort of "First Lord of the Admiralty." In this position it was his duty to make maps, and to write the native name on that part representing the Western hemisphere.

Those who did not know that his name was Alberticus, and who only heard of him as the Amerigo Vespucci, who

had travelled to the Newfoundland which had been named America, must have naturally arrived at the conclusion that the country had received his name, and that an officer of the Government would not have been permitted this honor, if he had not discovered it. Here was the first mistake. Then, if he had made the discovery, he must have made the first voyages, which were necessarily ascribed to him. There was mistake number two. Now, printing had been invented about this time, and a press was given by the Duke of Lorraine, to the monastery at St. Die, where the monk Waltzemüller was the principal. They had read the publications of Vespucci on the Newfoundland, and they wished to show their friends the wonders of printing; therefore, on the 26th of April, 1507, a little pamphlet was issued, with a map of the world—apparently their pioneer work. In tracing the Newfoundland, they were guided by the published letters of Vespucci, and in the preface of the work, it is SUGGESTED, that the Western Continent be named America, after Amerigo, who, they add, had discovered it. It is known that there was intimate communication between St. Die and Rome, so that this work must have been known there, soon after publication, therefore, if the proposed name were adopted, it would have appeared on the subsequent maps, which were published at Rome; but the proposition was not accepted, for in 1508, the map of Ruysch was printed there, which included the Newfoundland, without giving it any name. Then came the map of Sylvannus, in 1511, (four years after the proposition of St. Die), where it is named "Terra Sanctæ Crucis," or Land of the Holy Cross. Next year brought a map (also made in Rome) by Strobnicza, who proposed: "to call the Western hemisphere, America,

because it was discovered and had become known, by the travels of Americus Vespuccius." In the following year, Waltzemüller, from whom this error emanated, apparently to rectify the mistake, issued a map, and on the part inscribed "Map of the New Land" (Tabula terre nove), he wrote: "This land, with the adjacent isles, was found by Columbus, an officer in command for the King of Castile," (Hec terra cum adjacentibus insulis, inventa est per Columbum, januensem ex mandato regis Castille).

The people of St. Die had no doubt long ago discovered their error in supposing that Vespucci had found the new continent, but no one had taken their suggestion for five years, so they left it in oblivion; but in 1512, the year of Vespucci's death, it is repeated, and then next year they honorably publish a correction of the mistake, withdrawing their proposition and giving the reason. Yet in 1520, seven years after this, the map of Apianus appears, where the new discovery is named America.

An argument that the country was named by Vespucci would be on the ground, that the *suggestion* referred to was accepted. But then there is no evidence of it, and it is impossible to explain the concurrent circumstances.

Why is there no evidence to show that Vespucci named America, or attempted to do so?

Why is the name America, and not Vespucci, as customary?

Why is Vespucci frequently called Alberticus, if Amerigo were his proper name?

Why did not Columbus or his friends object?

Why did proud Spain accept this insult, and permit this injustice to Columbus, while paying his remains the highest honor?

Why were other names given to the country, many years subsequently to the suggestion to name it after Vespucci?

Why was the name adopted after they knew that those who had made that suggestion had withdrawn it and explained the error from which it had originated?

What reason is there for supposing, that a name was accepted, which was suggested by people, who had nothing whatever to do with the Newfoundland or its Spanish explorers?

If the name were given to the country, by Vespucci, or his friends, why was it otherwise known during his life, while that of America does not appear on a map until eight years after his death?

Why is the country apparently named in an Icelandic Saga, five hundred years before Vespucci, as *Irland-ik-mikla*, which name has identically the same meaning as that pointed out by the Peruvian history and language, as the etymology of the name of America. In a word, there is not a single fact in unison with the assumption, that America is named after Vespucci.

On the other hand, the Sacred Book of the Peruvians shows that Amarca or America was the national name of their nation. This is confirmed by the historians, Torquemada and Ximenes, and by a host of geographers, who show that the Peruvians adopted the system of adding prefixes to the national name in designing their most important cities, such as Cundin-Amarca, Caj-Amarca, Pult-Amarca, Yan-Amarca, Ang-Amarca, Chenpi-Amarca, Vin-Amarca, while their Capitol was called "the Capitol of America," or the Capitol-Amarca. Then they were a nation of great civilization, a gigantic empire, the chief in the Western hemisphere, whose people were those first

known to the Spanish explorers who knew the native name.

Here is positive evidence, natural consequences and reason, without a single difficulty, while, on the other side, there is no evidence, nothing but a withdrawn suggestion, unnatural circumstances and inexplicable difficulties. The explanation suggested by common sense appears to be, that Spain knew the native name and adopted it. Then every point is intelligible, every question is satisfactorily answered, and the Western hemisphere, instead of bearing a name unfairly alleged to have been given by error and deception, is known by one of the highest antiquity, the most sacred in the oldest continent, not a dishonorable name, but that of its chief nation, an empire, second to none in antique civilization, originating like that of Africa, the name of the first place known to the Romans in that part of the globe to-day bearing this name, which afterward became that of the entire continent. So Amarca, or America, was the first known name of this continent, by her Spanish discoverers, and the only one, among those of the four quarters of the globe, of which the history and origin has been preserved, so far as it is known at present.

The mistaken belief in the origin of the name of America, may well be pardoned, if compared to other geographical errors. Many of the myths of old, are the results of attempts to explain unknown history, without evidence.

Even the other day, a writer, on reading of the Bay of Erin, in Trinidad, which Columbus found on arriving, suggested that an Irish family had probably lived there. He had, no doubt, forgotten that the natives called the island "Iere," and that the name of Erin, in various forms, is to be found more frequently in America than in the other

portions of the world. A celebrated geographer has even eclipsed the hero of the Bay of Erin.

Juan Bermudez, discovered the island bearing his name; then George Summers, an Englishman, was thrown on its shores, and, hearing nothing of Bermudez, he called it Summer's isle. Later on the name of the island appeared in a French geographical work, as "Island of the Summer" (Ile d'été). In the same way, an island which was called Dina Mograbin, or Western isle, by the Arabs, as it was to the west of Mauritius, appeared on a map as two islands, because the geographers who copied the Arabian name, did not understand its meaning, so they marked down an island for the word Western, and another for the word island, thus making one island into two by a stroke of the pen.

The Quichas, have not only left a history of their national name, but their language unmistakably explains its etymology. It may be supposed that this is going from fact to fiction, but ancient traditions do not die so easily. In some old French towns, the cry, "au gui del' an neuf," is heard on New Year's Day. What means this: "to the mistletoe of the new year"? It means that these people were once Druids, whose priests cut the mistletoe from the oak on New Year's Day, distributing them among the people, and, though Christianity was established in Gaul in 103, when Druidism was buried, yet here is a branch which has lived for eighteen centuries after the fall of the tree. In the same way, the high-pointed caps worn by the women in Iceland, in Normandy, and in the North of Europe, recall the fact, that all these people were originally Skandinavians.

To return to the name of *America*, the meaning of the word in Quicha, is rounding, or circling, which word is a metaphor of the sun, in the third stage of language, the first

stage being the root, the second, the agglutinative, or joining of roots, to express several ideas at once, and the third, the inflectional, *i. e.*, when the original sense of the joined roots has been lost, and that the word receives a general meaning. To find the origin of the name America, its construction must be examined. The history and language of Peru points out unmistakably, that the root "ar," in its primary, or er, in its secondary form, is the chief, in the name of America; therefore, it appears to be formed of three roots, Am-ar-ca or Am-eri-ca, which language explains in the following way: Am, is a universal root meaning great, which is found in many American names, as in Amagansett, Amatitlan, Amarucancha, &c. "Ar," meant the sun, which was universally the chief emblem of God, the great spirit. In Quicha, Pac, is for; Pac*arin*, it dawns; er, on high; Pac-*ari* or Hu-*aoi*, morning. Hua is Lord, old or ancient; yll-*arin*, light of the sun. The Incas were called children of the sun, and claimed descent from the Aym-*are* race, while the names of the first four brothers and governors of Amarca begin with Ayer. Hu-*yra* was their Æolus, and Hu-*ira*-Cocha, their chief god, or Hua, Lord; *ira*, sun; cocha, water—the sun rising from the water—hence the dawn. Arica was their chief seaport, and it may be that Peru means "*Eru*," for the dictionaries call attention to the fact, that the Peruvians were very fond of adding the letter P to words, so much so, that the Spaniards wrote many with a double P, while those more or less doubtful, were written with one only, in their dictionaries of the Peruvian language.

The root of R, has the most sacred meaning everywhere in America. I will only refer to some of the chief examples, which will also show the general adoption of the prefix gu, recalling a similar custom in Egypt, and in the old Dorian

dialect of Greece (the ancestor of the Latin), where the affix G, or K, is so common.

The Muzos say that Ara made the world. The Chippewayans, who are said to have had the same hieroglyphics as the Quichas, translate the sense of great or powerful by Yedaringe, apparently a combination of ye, heaven, and are, friend. Oyaron, was one of the Huron trinity, and Areskoni, their god of war. The Eries or Ouragies, who lived near Lakes Erie and Huron, were five nations, including the *Erreronons*, Toronto-qu-errons, and Andasto-qu-*errons*. The Gu-*arani*, the chief tribe of Brazil, were called *U-ara-u* by the Caribs, and Gu-araci was their god. The Tupe tribe of Brazil, say that *Irin*-Mazé was, alone saved from the deluge. The Muycas, (whose hero and first pontiff lived in the holy valley of *Iraca*,) inhabited the plains of *Ariari*, on the Orinoco, while this river was under the control of tribes whose chiefs were the Gu-*aranos*, and Gu-*arico* was the native capitol of Cuba. The Haitian god, Oubec *Eyeri*, or, the heart of heaven, taught, that the good would be Ichieri, while Atabeïra, was the first woman, and Gu-amanocon the Supreme Ruler of all things. Ier meant light, and Turey heaven. The *Iro*-quois or Six Nations occupied Canada, between the Lakes Ont-*ario*, *Huron* and *Erie*. In their tongue, *Eri* meant heart; arien, warm; orienta, conscience. *Ari* tha tha con, meant their pontiff. The name *Iro*-quois appears to mean people of god. In Senecca (an Iro*quois* tribe), un*quoh* is man; mus*quah*, bear; kela*quah*, sun; kilo*quah*, moon; ohta*quah*, shoes. In Athapacas, che*quois* is woman. The common expression for God in America, was "the heart of heaven." Votan, was the great Mayan hero, and in the Chontal dialect of Mayan, Votan, means the heart, and hearts were the most sacred offerings, to the Mexican gods. So that Eri (heart), quois (people),

or Iroquois appears to explain this name. They called New York To-arey-una, which appears on an old Dutch map; Virginia, they named Aragiske, and its Governor, Assaripoa, assira meaning white. The *Ara*-waks were taught religion by *Ore*hu, a woman sent by the god *Ara*-wanili, the father of the god Gu-*Amaracon*, living in the sun, recalling the Greek Apollo, a divine being also living in the sun. This nation inhabited Trinidad (which was called I*ere* by the natives); they also lived on the mainland. Their tongue was called *Eyeri* or Ca-*iri*, while Trinidad, or *Iere*, is said to have been named after the Caribs or Ca-*ïribs*, who were the chief nation of the West Indies. Here was the Bay of Erin, where Columbus landed and saw the Western Continent.

In Ca*ïri* or *Irica*, cai, and caya, means isle, recalling the Greek ga and gaia, earth or land. Ca, is town or district in Mayan, and the American term of gua, so generally added to names, has the same meaning. Here then is Ca*ïri* or *Irica*, the Land of the sun, within sight of Am-*eri*-ca, the great Land of the Dawn, which, like Nie-hon or Japan, the Land of the Dawn, was civilized by China, whose Emperor is the son of heaven, while the pedigree of the Mikado goes to Tenshô Daijin, the sun goddess. Then turning to the Sagas of Iceland, the Landnamabok gives a description of a country on which Ari Marrson landed in 983 A. D., having been blown on the coast during a gale of wind. The name given to it is Irland-ik-mikla, or Irland the Great, and it is believed, that the land described, is that now known as North and South Carolina, Georgia and Florida.

In the other parts of the world, the root R, was used to express the most sublime thought. In Egyptian er, meant divine manifestation, ar, eye and symbol of action. In the Koran, Irem is heaven. In Arabic arek noble, arif knowl-

edge, aryah victory, arik throne. In Hebrew, Urim, is believed by many, to be the ineffable name of Jehovah, and aur, means celestial light. In Assyrian, our, means eternal splendor, and is God in Chaldean. Assyria was called A*turia*. At means God. *Aria* was the name of Syria. *Ara*this was a Syrian divinity, while *Ara*thris was the chief Phenocian god. In Persian *ar*, is great, *ara* beautiful, ahûro God. Herodotus says, that the Medes were first called *Arii*. *Iri*, is the name under which the Cingalese adore the sun. In the Polynesian isles the same evidence is found. *Oro* is their chief god, *eri*-rahi king, *eri* chief, which is not at all surprising, when it is recollected, that the Malayan race are spread over five-ninths of the globe. In New Zealand, arika is priest, *ari* great or strong, aroha love, and similar evidence is found among the old Guanches. The Irish nobles were *Aries*, their courts Airecht, and *Eire* was the mythological name of the island. In Irish earc is heaven, arach soul, arac throne. *Aria* was the oldest name of Greece, and their Eros created the world and was the first of gods or men. In Italy Iria was a name of Cantabria. Camerina, in Sicily, was near the isle of Iera, also the Eraia mountains, while the Eddic Valkyries, who carry the souls of heroes to heaven, have been connected with the Greek Erinnys. The famous Trojans went to Troas from Crete. Æria was a name of Crete. Hesiod says that Zeus was born there. He wears the horns of Aries, the ram, the first sign of the Zodiac, and Amalthea, the Kimaira, or she goat, fed him. Whether the most sacred and greatest name in Africa—that is, Meroe—contains a similar root, like Mars, which was the Roman form of Ares, is a still more difficult problem to solve.

In a word, the root R, has given the geographical appellation to the entire planet, in its Saxon name the earth, or

era in Greek and îra in Sanscrit, which is re-echoed in all its divisions. It is not surprising, therefore, to find that Aryan was the oldest name of India, Eran of Persia, Uric of Upper Egypt, Aria of Greece, Erin of the Celts, and Am-eri-ca that of the chief nation of the Western hemisphere, while the word chthonious, in *Ere*chthonius, the national hero of the Athenians, predicates a root Kham, hence *Ere*kham or Kam*ere*, which recalls the Kym-*ri*, the chief Celtic nation of Britain, whose history mentions that they went to Britain from Greece. Then Khem, the name of Lower Egypt, and Uric that of Upper, while the numerous connections between the two hemispheres warrant the addition of Hun *Camé* and Vukub *Camé*, the first kings of Xibalba. The town of Camiro, mentioned in the myth of Romulus, and of Camiro in Rhodes, where traditions are found coinciding with those of the Celts, have also come from the same source probably.

I now show that R, means the earth, which is apparently a negative of my argument, that it meant the sun, but so far from proving a negative, it is confirmatory, for the ancients taught that the earth was a sun. This was the doctrine of Pythagoras, the inventor of music, who, after studying twenty-two years in Egypt (600 B. C.), returned home, and taught the Greeks that the earth was a sun, while the Chinese astronomers said, that the earth was a spot in the heavens.

In tracing the meaning of the root "R" to the sun, I ought to say that the sun was universally taken as an emblem of God, and that few, if any, of the ancient nations were sun-worshippers. I think that I have pointed out this, among other things, in a work which I am completing.

I have also shown that R and T, or the cross, are at least

connected if not of similar origin, while in China, the cross means the earth, and is pronounced *'t'u* (recalling the Egyptian Tau, cross), the earth being considered a sun. I think that I have also found sufficient evidence to show that Chinese knowledge came from Egypt. The universal respect for the † from the dawn of history, as the altar of divine sacrifice, and the administrator of justice—in Egypt, in America, by the Skandinavian cruciform hammer of Thor, everywhere—is only explained in one work, of all the sacred books of the earth. The † in Egypt and China, was originally the figure of a man, but why has it become the most sacred of all emblems? "So God created man in his own image," is written on the first chapter of the Old Testament, while the science of philology, leads sometimes an atheist, by a road, which echoes at every step, that "the whole earth was of one language and of one speech."

My object in going into this, is to show that the signs which were related to R, held an equally sacred meaning, and that although the root R, which meant the sun, was universally held in the highest reverence, it is not evidence of sun-worship. The Mexican traditions say, that Votan taught them to worship a Supreme Deity, whom he called "the God of all truth." The Veda says: "That which is one, the wise call him many," while the nine Egyptian gods were only said to be the self-development of Ra. The Greeks said that Apollo was a divine being, living in the sun, while part of the Huron prayer was: "Vouchsafe unto us the light of the sun, which speaks thy grandeur and power."

The sun, therefore, was the emblem of God, so that the name Am-eri-ca, or great land of the sun, meant the great holy land, and this is the meaning implied in the Skandinavian name of Irland-ik-mikla, while the Peruvians

claimed descent from the Toltecas of Tulan. These two names suggest a very common accident, the loss of an initial vowel, like the name of the Lenni Lenappes, who are called "*oleni*" in the early part of their history. Thus, ot-ol-teca or ot, country; ol or ollen, the sun; and teca, people, who claim Tulan, or ot-ulan, or ot-ollen, meaning the country of the sun, suggests that their descendants, in taking the name of America, had simply translated the meaning of the name of their ancestors, and this translation, naturally presenting itself, appears to confirm an important part of their historic traditions.

I ought not to conclude without reminding you, that the honor of any erudition which may appear herein, belongs not to me, but to the learned and indefatigable men, who have preserved the material, which I have attempted to put together. Their nations may well be proud of them, while they, having lived under a form of government which had the power to honor, and who used lavishly the means to encourage art and science, were fortunate enough to find their works preserved for the future, and not "Love's Labour Lost."

For myself, I ought to say, that in case I have made any mistake, I will ask you to remember that I have had no assistance whatever, and that although I have taken every care to avoid error, yet the works which I have consulted are sufficiently perplexing, to admit of that possibility. The principal evidence I have quoted, has been taken from old Spanish, Italian and French, while I have examined over thirty of the aboriginal languages of America, as well as Hieroglyphic, Hieratic, Demotic, Coptic, Latin, Greek, and Shemetic.

THE PHILIPPINE ISLANDS.

Their Physical Characters, Customs of the People, Products, Earthquake Phenomena, and Savage Tribes.

BY

SAMUEL KNEELAND, M. D.

Named after Philip II., in 1521, Prince of Asturia, they are situated between 5° 32′ and 19° 38′ N., and between 114° 56′ and 125° 43′ E. of Paris. Their extent is about 1,050 miles N. and S. and 700 from E. to W.; the China sea is on the N. and N. W., the Sooloo and China seas on the S. W., and the Pacific on the east. They are very numerous, but only about forty are of any importance; of these Luzon, of which Manila is the capital, is the largest, being 350 by 175 miles; after this the most important are Panay, Mindoro, Cebu, and Mindanao.

The discovery of the Pacific ocean at San Miguel by Balboa in 1513 led Magellan (Magalhaens) to believe that the American continent terminated southward in a point of land similar to the Cape of Good Hope. Under the auspices of Charles V. of Spain, he sailed from Seville August 19, 1519, with a squadron of five vessels, twenty-seven years after the discovery of America by Columbus; after great dangers and privations he entered the Straits which bear his name in August, 1520, and came out into the Pacific on November 1st, after a voyage of fifteen months. He then sailed in a northerly direction for thirty days without seeing land; passing the Ladrone or Marianne Islands, he

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came to Mindanao and the Philippine group, claiming possession of the whole in the name of the King, March 16, 1521, naming them after St. Lazarus, on account of the day; he was soon after killed in an affray with the natives, and was succeeded by Del Cano, who returned to Spain September 6, 1522, three years and a month after Magellan's departure, with only eighteen out of more than three hundred men. Del Cano was thus the *first* man who circumnavigated the globe, though this honor has been given to others.

Four other expeditions sailed between 1524 and 1564, all unsuccessful except the last, under Legaspi, in the reign of Philip II., who reached the islands in February, 1565, of which he took formal possession, first Cebu and then Panay; he established the capital in Manila in May, 1571, and died in August, 1572, since which the islands have practically belonged to Spain.

Their conquest and retention have been effected in a remarkable way. Legaspi had with him six monks of the Order of St. Augustin, and with these and a handful of soldiers the work was accomplished, without cruelty or persecution, and by the gentle perseverance and example of these devoted priests.

After Legaspi, his grandson, Juan de Salcedo, was the most important of the Spanish conquerors; he subjugated the coasts of almost the whole northern portion of Luzon, but could not penetrate into the interior; he defeated the squadron of Chinese pirates under Li Mahon in 1574; he died in 1576, and has well been called the "Cortez" of the Philippines. Between 1580 and 1640 these islands enjoyed their greatest power, their Governor acting like a prince; after this the jealousy of the Dutch, commercial rivalry,

and native opposition combined to check all progress, and their subsequent history is that of almost all the Spanish-American colonies—home strife, inglorious wars against pirates, and the struggle of the clergy for supremacy. In 1762 Manila was captured by an English fleet, but held only a year.

Though these islands are admirably situated for commerce with Chinese, East Indian and Californian ports, intercourse with other countries is as yet in its infancy; the same want of enterprise, jealousy of other nations, and old-fashioned ideas of political economy, exist now as three and a half centuries ago, when a single voyage and return, each year, from Acapulco, Mexico, to Manila constituted the trade between New and Old Spain.

The bay of Manila, distant from Hong Kong about 650 miles in a S. E. direction, is large enough to hold all the navies of the world, being over 25 miles in diameter, land locked except on the W. S. W. side; it is not, therefore, a safe roadstead in the S. W. monsoon, during which large vessels seek shelter at Cavite (really the port), 7 miles south of Manila. Its distant surroundings are fine, with Mt. Aryat, over 3,000 ft. high, in the N. N. W., the visibility of whose double peak is a sign of pleasant weather—Mariveles on the W., with its slopes fertile to the water's edge—Majayjay, 6,500 ft. high, to the S.—and ranges of lesser mountains, giving to the landscape the most varied outlines and shades of color. Though 120 miles in circumference, the shores near Manila are low, and little better than a vast verdant swamp in the rainy season.

The old city resembles a dilapidated fortress, surrounded by crumbling stone walls, nearly 300 years old, and wide but shallow moat, used now as a wallowing place for the

water buffaloes; the gates are never closed, nor the drawbridges raised.

Rounding the old fort and the light-house, you come into a fleet of small steamers and sailing craft, indicating an extensive coasting trade. Several creeks branch from the river, making a much used network of communication with the suburbs and distant villages. Around the walls, and by the edge of the sea, is the *calzada*, or fashionable drive, lined with almond trees, which every evening presents a gay scene of carriages; there is usually no dust, the air is balmy, the heat is tempered by the sea breeze, and a native band discourses excellent music several times a week. The streets are for the most part well paved, and the roads in the suburbs, except in the rainy season, good. It is the most Europeanized city of the East, a tropical compound of Naples and Venice, modified by Chinese thrift, English energy, Spanish slowness, and native jolly indifference. Of the nearly 300,000 people in the province, the greater part are Indians, mostly laborers; there are at least 25,000 Chinese, petty merchants and mechanics; many half-breeds between the two, with the physical type and vices of both races; not more than 5,000 Spaniards, with perhaps 500 other Europeans, and about 25 Americans.

Manila is very poor in monuments. In the square near the theatre, is an ordinary bronze statue of Isabella II.; on the drive-way outside the walls, a marble shaft commemorating the deeds of Spanish soldiers who fell in the battles with Chinese pirates. The most noteworthy monument is that to Magellan, a cylindrical pillar, surmounted by a globe encircled by meridians, emblematic of the circumnavigation of the earth.

Their greatest extent being north and south, and several

degrees, they enjoy a remarkable variety of climate, superior to that of the Dutch East Indies, whose chief width is from east to west; this is also modified by the irregularity of the surface, so that the palm and the pine, the maize and the orange, alike flourish.

From November to April, the temperature, though often reaching 82° F., is not oppressive, and the nights and early mornings are generally cool. In the rainy season, or that of the S. W. monsoon, from May to November, the heat is like that of our dog-days, enervating and, from its long continuance, unhealthy for strangers, who are usually careless; when the thermometer indicates 65° or even 68°, it feels chilly, and a blanket at night is comfortable. In the region of Manila, it is generally dry in the Winter and early Spring; the heaviest rains are in August and September, and the lightest in March and April; January and February, with their prevailing north winds, are the coldest months, April and May the hottest. A meteorological observatory has for some years been maintained at Manila, under the charge of Padre Faura; it publishes a daily bulletin of the weather, carefully drawn up by the Jesuit fathers.

At the changes of the monsoons, violent tempests, or typhoons, prevail on land and sea, causing great destruction of property and even of life; in one of these baguios at Manila in 1865, the velocity of the wind was 125 feet a second, more than 85 miles an hour, and many vessels were driven on shore. A more severe one occurred Oct. 20, 1882, ravaging the city, unroofing thousands of houses, and crippling several ships; it set back the prosperity of the island at least two years.

In the *month* of September, the rain has been known, according to Dove, to fall in Manila to the amount of 59

inches, or almost three times the *annual* rainfall of Berlin. Endemic diseases are rare, and the climate, with ordinary precautions, may be called a healthy one, especially in the high lands and near the sea. Cholera has been epidemic several times, and last in August and September, 1882, but in no worse form than in temperate and even cold Europe.

In a climate like this, dwellings must be constructed for the double purpose of shutting out the sun's heat and securing light and ventilation. An element which must also be regarded, is safety in case of earthquakes. In former times the churches and most of the better class of houses were built of solid stone on firm foundations, weight being considered necessary for permanence; now the lower story is built of stone, but the upper one of wood resting on posts of the same material, and independent of the stone; so that the earthquake may crack and destroy the walls on the ground, and the structure above remain comparatively uninjured. The heavy earthen tiles of the roof are replaced by sheets of galvanized iron. The ground floor is used for offices, shops, and storehouses, while the lodging rooms are above; for glass, translucent oyster shells are substituted. The floors are of polished or waxed hard woods, and there are no carpets, curtains, or upholstery to collect dust and harbor moths. The furniture and the bedsteads are cane-bottomed; mattresses are unknown, straw mattings being soft enough and delightfully cool. The illumination of the streets is by kerosene, as gas-pipes are impracticable in their unstable soil; in dwellings and shops, candles or lamps of cocoanut oil are used for safety, as the earthquake impresses its conditions upon every occupation and condition of society.

The native houses are made of bamboo, and thatched with the leaves of the nipa palm; they cost little, weigh only a few hundred pounds, and are readily replaced in case of conflagration or overthrow. The water supply of Manila is at present scanty; the river within the city is undrinkable, and the main supply is brought by boys and girls from the surrounding hills, and carried from house to house. An aqueduct is now nearly completed, which will convey pure water from the hills of Mariquina.

The railroad, except the street tramways in Manila, is as yet unknown in these lands; carabaos or buffaloes, horses, and men are the beasts of burden; the banca, or canoe, on the rivers which penetrate in almost every direction to the base of the mountains, is the favorite, and often the sole method of conveyance for the people and their merchandise from the villages to the sea. Strange as it may appear, no one seems to want any roads, though their construction would tend to the rapid development of the country—the natives are opposed, as it requires labor to make and maintain them, for which no pay is received—the home authorities prefer to spend the funds in projects of a more local nature—the priests are equally averse, as facility of communication leads to a profit and increase of intelligence which would lessen their influence—the general government is of the same opinion, Spanish-like, isolating these provinces in order to rule them more easily, on the principle of "divide and conquer."

When Spain lost her American colonies, her revenues were so diminished that her remaining ones were more heavily taxed. The Philippines began to yield a revenue to the mother country about the beginning of this century, when Manila was opened to the trade of all nations; beside

the customs, the other principal sources are the tobacco tax and the tribute exacted from the natives and Chinese; additional sums are obtained by taxes on exports, on cocoa, opium and palm wine, on cock fights, paper, and on all trades and business.

The export of sugar has been trebled and that of hemp doubled within 20 years, largely by American enterprise, and a tenfold increase is possible. For the year 1881, the value of the hemp and sugar sent to the United States was about $18,000,000, and of that sent to Europe and Australia nearly as much more,—a considerable item in the commerce of the world, coming from these comparatively unknown and partially developed islands.

There is probably no foreign port where a larger portion of the trade is done by American ships, and yet no vessel-of-war of the United States is stationed anywhere near them.

For the year 1882, the exports of hemp and sugar were considerably less than in 1881, as in that year cholera raged among the natives, and disastrous typhoons destroyed much of the growing crops.

The old laws compelled the Indian to cultivate tobacco in certain regions, where the necessaries of life were obtained with difficulty, to the exclusion of his own crops, under such penalties that the monopoly was extremely odious and unjust.

After January, 1883, the cultivation, sale, and manufacture were made free; this will stimulate production and secure a finer quality, as each small planter will do the best he can, and will not sell till he thinks he gets a fair price; better cigars will be made, but at a higher price; there will, as usual, be cigars of all grades, but no more good ones will

be obtainable at 1½ to 2 cents each. The tobacco factories, employing many thousand girls, are now carried on by private individuals, and the increased demand for the raw material has resulted in a large profit for the government. This spasmodic activity will probably soon subside, and the business settle down to a natural basis; the manufacture will doubtless draw to the island many skilled persons from Cuba and Germany, who, with improved machinery and processes, and ample capital, will greatly extend this industry.

The present natives are generally believed to be of Malay origin, and to have been driven there from the Pacific islands, involuntarily and accidentally, in their boats by the monsoons; such arrivals are not unfrequent at the present time. They have the same form, character, and habits, though of more agreeable and manly features than barbarous branches of the same race. Those of the southern islands look more like Malays than do the Tagals of Luzon, who are more or less mixed with Chinese, Japanese, and Negritos; in some islands the Chinese, in others the Japanese type prevails, according to the proximity of these countries.

The habit of chewing betel or buyo is almost universal in the Philippines, as in many other countries of Asia, Africa, and Oceanica; the red teeth of the people of Ceylon, Calcutta, Madras, China, Annam, and Japan have been noticed by all travellers. Buyo is a bitter pungent compound of a thin slice of the fresh bonga, the nut of the areca palm, enveloped in the green leaf of the betel pepper; within is put a little lime to increase the stimulus of the morsel, which is about as large as a flattened almond, an

inch in diameter and $\frac{1}{6}$ of an inch thick. This is chewed like tobacco, and the saliva under its action stains the teeth and lips red. A custom so widespread must rest on some real or fancied advantage in a tropical climate; it is claimed that it is antacid, astringent, and gently stimulating, preventing intestinal diseases.

The Spanish and the Portuguese seem to be the only races that can take root in the tropics; the Dutch, the English, and the French are only sojourners and always foreigners; the former mix with the people, and by degrees exterminate the native civilization, as that of the Mexicans and Peruvians.

Nature supplies the Indian with rice, fruits, roots, fish, and excellent water, and his skin is his principal garment: he has, therefore, little inducement to work.

I know of no race more independent of the industrial arts. His knife, or *bolo*, is his only essential implement; his spoon, bowl and basket he finds in the shell of the cocoa-nut; his basin, plate and umbrella in the leaf of the banana; most of his domestic utensils in the bamboo; his house, his mat, his hat in the various kinds of palm; his fruit requires no cooking, and his fish and rice only the simplest; if ever there were a child of nature, the Tagal is one.

Insects are of great variety and of gorgeous colors; mosquitoes and locusts pierce the skin and devour the grain; leeches, often every minute, drop on you from trees and swarm in the still waters; ticks fasten themselves as you go through the woods; centipedes and scorpions bite and sting in any uncovered place; huge roaches eat your clothing and your note-books. The agile and chirping lizard

looks down from his perch overhead as he crawls in the evening in search of bugs; large bats or flying foxes, with body as large as a half-grown cat, and a spread of wings of 4 feet, now and then enter the houses, fruit-eaters but not blood-suckers; the fire-flies congregate in such numbers that the tamarind trees resemble jeweled pyramids; the sprigs of the young rattan hook your clothing and tear your flesh; the bees resent your intrusion into their haunts, and the monkeys chatter and scream like imps; a poisonous bush nettle (*lipa*) inflicts stings so painful that one region where they abound is uninhabitable. The traveller has to meet these and many more troublesome natives in his explorations.

The Philippine islanders are noted for their skill in weaving the vegetable fibres of their country, and especially those of the pine-apple, hemp, bamboo, palm and reeds, and also the silken fabrics called *jusi;* the latter, about which much confusion prevails, is raw silk (from China) as distinguished from reeled silk or *seda*. Some of the inner fibres of the hemp stalk are so fine (*lupis*) that they may be mistaken for silk; in commerce *jusi* means any filmy tissue, whether of silk, piña, or hemp, singly or combined. There is no country where more durable and beautiful woods for household, mechanical or cabinet work are to be found, than in these mountain forests; unlike most tropical woods they are hard and fine grained, susceptible of the highest polish and specially durable in moist soils and underwater. Most of them are attacked by the *anay*, or white ant (*termes*). Most of the precious and useful metals occur, but not in such quantities as to tempt treasure-seekers. Gold is found in the streams, rich veins of iron and

coal, copper, sulphur, and durable marbles. There are no large carnivora, the most formidable wild creature being the carabao or buffalo.

The lake of Bay, the Laguna, to the E. and a little S. of Manila, is reached by the river Pasig, passing the pretty villages of Santa Anna, Guadaloupe, and Pasig; it is a shallow, wind-swept expanse, with high lands to the south and west, about 110 miles in circumference, very irregular in shape, and 25 miles across to the Straits of Quinabutasan. In the shallows at the entrance of the lake are long rows of stakes for the support of the bamboo fish-nets, and water-surrounded huts for the fishermen, recalling to mind the views given by ethnologists of the pre-historic dwellings of the Swiss Lakes.

Each of the 33 provinces has its governor or alcalde, responsible to the Governor-General, usually military men; they exercise both judicial and executive functions, and receive the taxes; as they are allowed to trade, an unscrupulous man has the power to oppress the people to his own advantage. The provinces are subdivided into pueblos, each having its chief magistrate, responsible to the alcalde; the mayor may delegate his authority to some subordinate, and he again to a lower official, till it becomes impossible to get anything done, from the minute subdivision of responsibility.

A traveller unprovided with letters of introduction may in every village apply to the tribunal or town house, where, on showing his passport, he may claim shelter and a place to lie down; he can obtain food and other necessaries for his journey at fixed prices; as a rule, however, the priests entertain strangers, very properly expecting a small gratuity for the parish church.

Santa Cruz is the capital of this province, and numbers about 12,000 inhabitants ; it is situated on a wide river, and is a town of considerable trade.

I noticed here, as elsewhere, how distant forests, especially if gently rising from the observer's eyes, have very much the same appearance whether in temperate or tropical zones ; but a near view discloses bright scentless flowers, and variegated leaves peculiar to warm climates.

Luzon is traversed by a mountain chain from N. to S. ; Majayjay is one of the highest peaks, and all show marks of great volcanic disturbance ; Mayon is almost always crowned with fire. On the way to the cascade of Botocan, we passed Magdalena, a village of some 4,000 inhabitants; in two and a half hours we reached Majayjay, with 9,000 people, having a fine old Jesuit church whose buttressed walls have thus far withstood the earthquakes which have spread destruction in the neighborhood. We reached the fall at noon, on a bright day, when the abyss was spanned by ever changing rainbows ; the fall is 300 feet high, on the river Camatian, quite perpendicular, and 80 feet wide ; the brink and sides are of dark volcanic rock, wreathed and festooned by vines and ferns. On the verge it is divided into three columns, which descend at first separately, but finally mingle when lost in the depths below. The sides are perpendicular, and have evidently been cut by the river itself ; it is fully equal, in my opinion, to any of the waterfalls of the Alps, and reminded me of the " Rainbow Fall," near Hilo, Sandwich Islands.

Majayjay, or Banajao, is about 6,500 feet high, and an extinct volcano ; its crater is of unknown depth, certainly not less than 1,000 feet, and formerly contained a lake

which disappeared in its last eruption in 1730; its present circumference is three miles, and the large stones thrown from it are scattered far and wide beyond its lava flows.

Los Baños, not far from Santa Cruz, was once a favorite resort for invalids, who wished to avail themselves of its sulphurous waters; these flow from the base of the volcano of Maquiling, and are hot enough at the source to boil an egg; where they issue into the lakes crocodiles are sometimes seen, but not so commonly as travellers' tales assert.

A little lower down the lake is Calamba, the point of departure for the lake of Bonbon and the volcano of Taal. The lake is 70 miles in circumference, and the volcano is in the middle of it. It is difficult to climb the cone, as it is a mass of yielding cinders and sharp clinkers of every size and shape, rent by dangerous chasms and precipices; it is 1,200 feet high, and its oval ragged crater is 6 miles in circumference; in the bottom is a black pit, 2,500 feet across, and a sulphurous lake constantly emitting suffocating fumes. Its descent of several hundred feet is dangerous; Dr. Kane, the Arctic explorer, nearly lost his life in the attempt, having been drawn out by the ropes fortunately attached to him, in an insensible condition.

Of the provinces of Northern Luzon, most of them north of Manila, the most important are: *Abra*, with 40,000 inhabitants (of whom 12,000 are wild tribes); chief crop, tobacco. *Bataan*, 52,000; celebrated for its fine timber and fruits. *Batangas*, 325,000; crops, coffee and sugar; language, Tagal. *Benguet*, 22,000, mostly Pagans; mountainous and cool. *Bulacan*, 300,000; famous for hats and cigar cases. *Cagayan*, at the extreme north, with 81,000; producing the best tobacco in the island. *Cavite*, 150,000,

is noted for the best coffee in the country, and excellent cigars. *Ilocos*, North, with 160,000, and South, with 180,000; tobacco, rice, and fine fabrics of cotton and silk. *Isabella*, 35,000; raising tobacco; there are many wild tribes and negritos in the mountains and forests. *Laguna*, 137,000; a grain and fruit region. *Morong*, 31,500; from which the daily vegetable and fruit supply of Manila is largely derived. *Nueva Ecija*, with 106,000, and *Nueva Vizcaya*, with 28,000, and many wild tribes. *Pampanga*, 220,000; exceedingly fertile. *Pangasinan*, 260,000, famous for coffee, rice, sugar and hats. *Zambales*, in the west, 100,000, containing Subic, the best harbor in the group.

It seems to be universally admitted that the Philippines were inhabited, at an early period, by a race of blacks resembling the Papuans, of small size, hence called Negritos. It is also certain that the Malays drove them into the interior, where they now dwell. The Malays either found there, or were soon joined by, Japanese, Chinese, Siamese, Dyaks from Borneo and Celebes, and Javanese; so that we should expect to find the present natives a very mixed race, who have received different names in each locality. Total population about 7,000,000.

I think the name of *igorrote* should be restricted to those living in Northern Luzon, who are hybrids of Japanese and Chinese, with the Indians, differing somewhat in features and customs, according to the principal admixture. The stature is low but the form well developed, indicating great strength; color very dark, eyes oblique, nose flat, lips thick, cheeks wide, and hair long; their houses, utensils and weapons, are of the rudest description. Their presence

would be naturally accounted for as the descendants of the army of the Chinese pirate Li Mahon, whose fleet was destroyed after his attack on Manila, Nov. 30th, 1574; the fugitives escaped to the mountains north of the city, and for more than three centuries these wild hybrids have defied the power of Spain. They have their own dialects, but the igorrote proper is spoken by over ten thousand people; they are not wholly savage, except in the remote mountainous districts; their customs are simple and patriarchal; it is only within a few years that they have buried their dead, instead of exposing them to decay in the air.

There are also hybrids between the Japanese and Indian in North Ilocos; of finer shape, lighter color, less oblique eyes, and more prominent nose; in their habits, music, and love for porcelain vases, they resemble the Japanese, and have probably descended from the union of the crews of Japanese junks, driven to Luzon by the northern monsoon, and the neighboring tribes. They are over nine thousand in number, occupying twenty villages.

Iloilo, on the Island of Panay, is the Southern centre of the sugar region; it was opened as a port in 1855, and is the second in the Archipelago both for foreign and coastwise commerce. The time from Manila by steamer is thirty-eight to forty hours, and the passage between Luzon and Mindoro, along many beautiful islands, the most notable of which are Tablas and Guymaras—wooded and high, but apparently almost uninhabited. It numbers over 15,000 inhabitants, largely mixed with Chinese; it is a very busy place, as steamers can come and go directly to the banks of the river, which is a deep arm of the sea; being near the ocean, it is cool and comfortable, though 350 miles south of

Manila. Panay is one of the Visayan Islands, whose language is spoken by more than 2,000,000 people, and is the most widely distributed of the forty dialects. The Visayas formerly had the custom of painting or burning their bodies, an evidence of Papuan intermixture; they may be said, in a general way, to occupy the Archipelago between Luzon and Mindanao.

Asia, at a comparatively recent geological period, and perhaps before the distribution of the primitive races, no doubt included Borneo, Sumatra and Java; Borneo is quite near to Paragua, the most westerly of the Philippines; and from this the migrations of the natives, northward and eastward, would be easy, even in boats of moderate size. In this way would be explained many customs and ceremonies in the southern group resembling those of the Dyaks, and the occurrence of the peculiar lemur-like animals of Borneo in Samar and other islands.

Among the provinces of this region may be mentioned:—*Antique*, with 106,000 people, forming the west shore of the island of Panay. *Capiz*, on the north of Panay, with 200,000, separated from Iloilo by a mountain range. *Cebu*, 380,000, settled by Legaspi in 1565, who founded the city of this name, the capital of the Visayan group; the island is 110 miles long by 30 wide, and is traversed by a mountain range from north to south; it is the seat of a bishopric. *Leite*, with 222,000, its best known port being Tacloban, with over 7,000 inhabitants. *Masbate*, 13,000, fifty miles by eighteen, famous for its tobacco. *Mindoro*, 39,000, comprising also the Island of Marinduque. *Negros*, 226,000. *Samar*, 180,000, 120 miles by 60—beside sugar, they all produce hemp, rice, tobacco, alcohol, and cocoa-nut oil.

Connected with the Southern Archipelago are Jolo and Mindanao, of interest as resting-places in the transit of races from Borneo to the Philippines. Jolo is a labyrinth of about 150 small islands between Borneo and Mindanao, thirty to forty miles from each. Mindanao is the largest of the group after Luzon, with an estimated population of 300,000, of whom two-thirds are wild tribes. Magellan took possession of it on Easter Sunday 1521, but not more than one-tenth has ever been under Spanish rule.

A few miles north of Iloilo, we passed seven small islands of various sizes, to suit their names, called the "Seven Deadly Sins," which in these latitudes are envy, malice, pride, avarice, licentiousness, falsehood, and laziness. Sailing between Masbate and Ticao, at noon we reached Donzol, in the province of Albay; leaving there at night on our way south around the point of the Camarine peninsula, we came in sight of the volcano of Mayon, whose glowing top looked like a lighthouse, twenty-five miles distant. On our way back we had a fair view of the volcano of Bulusan, which has its periodical eruptions, but was then inactive as far as we could see; its cones resemble those of Vesuvius and Somma, the western or eruptive one apparently in the centre of an old crater of which the eastern is a remnant. Just at sunset, before reaching Pasacao, we passed a single rock, several miles from any land; it was of considerable size, with scanty vegetation, and had the poetic name of "*Anima Sola*," "solitary soul."

We skirted the splendid woods of Mariveles, which afford shelter to many negrito tribes or Ajetas; they number some 13,000 savages, living chiefly in the wooded mountains of N., S. and W. Luzon. They are doubtless the aborigines of the

islands, if not Papuans who went thither at a very early period from the southern groups of New Guinea, and who have been driven to the interior by the conquering Malays.

They are short in stature, about five feet, with slim figure and crisp black hair, which they wear as a bushy mop; the color is dark, lighter in those who dwell in the sunless forests, the nose flattened, the eyes large and restless, with the sclerotic yellowish white. They have no fixed habitations, but wander in small bands wherever food is abundant; they are skilful hunters; though their arms are of the rudest type, they are dangerous from their poisoned tips; they go nearly naked, the only covering being a band of bark around the loins. They are so mixed with the Igorrotes that it is difficult to find one of pure race. It seems to me that they are Asiatic Papuans, or a mixture of Polynesians with the latter, as distinguished from the present people of New Guinea.

In corroboration of the idea that the Philippines are, with others, the remains of a sunken continent, their geological structure may be mentioned. The volcanic rocks, though now the most noticeable, are subordinate to the crystalline and sedimentary; the presence of eruptive matters, the occurrence of gold and metamorphic limestones, prove this. They belong to the chain which extends from the Kurile Islands, through Japan, Formosa, and Mindanao to the Moluccas, throughout which eocene and more recent volcanic deposits are found on crystalline rocks.

Legaspi, the centre of the hemp district, was one of the earliest places occupied by the Spaniards in the sixteenth century, and is on the eastern or Pacific side of the Camarine peninsula. It is a straggling village, beginning at the

beach and ending in a marsh ; the houses are of a miserable character, and had recently been damaged by a tornado.

Daraga, a town of 19,000 inhabitants, five miles from Legaspi, is on the S. E. slope of the volcano of Mayon, whose eruption of 1814 destroyed the old town, the ruins of which may yet be seen among the lava covering. The natives of the Camarines are Vicols, who number 300,000 ; they did not seem to me to differ from the Tagals and Visayas in very important particulars, though inferior to the former and superior to the latter. The wild tribes are of older residence than the Malays, and have more customs in common with the Dyaks of Borneo than any other people of the Pacific—they are a very composite race.

The cone of Mayon is very symmetrical ; its lavas are mostly felspathic, like those of Etna ; I obtained many characteristic specimens, which are in the cabinet of the Boston Society of Natural History. At the date of my visit, December, 1881, it had poured out from the very summit, for five months without cessation, a stream of lava from the Legaspi side ; it displays by day a column of fleecy vapor, and at night a bubbling overflow of red-hot lava. Its height is in the neighborhood of 8,000 feet ; I believe its summit crater has never been attained ; though Jagor and others claim that they have stood upon its edge, they give no descriptive proofs of it. The eruptions of 1766 and 1814 did great damage to the neighboring villages. In the narrative of the Wilkes' Exploring Expedition V., and in the "Geology" of the same, Isarog, an extinct volcano, is confounded with Mayon, which is in another province, many miles distant, and of entirely different shape and character.

The so-called hemp of the Philippines, which is no hemp at all, but a plantain fibre, is obtained from the *musa textilis;* it resembles the banana, but is smaller and with a more pointed leaf; it thrives in the mountain cloud covered slopes near Albay. The trade, which now amounts to nearly 54,000 tons a year, arose from very humble beginnings, from American enterprise, in 1818. The fibres are employed in the natural state.

Of the provinces in the hemp region, the principal are: Albay, with 260,000 people, with the port of Sorsogon in the south, and Legaspi in the east; distance from Manila about 230 miles. N. Camarines, with 33,000, and S. Camarines, with 155,000, the latter including Mt. Isarog; the ports are Daet in the north and Pasacao in the south. On the neck of land between Legaspi and Tabaco, a carriage ride of three hours, which saves a much longer sea voyage, we crossed forty-nine mountain streams, most of them by fording.

In the village of Naga are the "geysers" of Luzon, resembling those of Iceland, though none of them now are "spouters." With considerable difficulty, being alone, I came to a space about five hundred feet square, in a mountain valley, where were several holes, some a foot across, from which steam was issuing and in which the sizzling of hot water could be seen and heard; the ground seemed honey-combed, and I trod carefully on what seemed a hollow steam-charged shell. Between two cones, one hot and another emitting vapor, was a beautiful basin, with white encrusted walls, filled with clear boiling-hot water. Though the energy is declining, the silicious cones, ridges, and basins, of every size and shape attested the volcanic activity which once existed here, whose last breath seems to be the geyser or hot spring.

On landing in Manila you cannot go far without meeting evidences of the earthquakes which have visited the city and vicinity, in ruined buildings, shattered churches, dilapidated walls, and heaps of rubbish—most the work of a few seconds in 1863 and 1880.

There is an intimate connection between the volcano and the earthquake, as is well shown in Italy, Sicily, Iceland, Central America, Java, and the Sandwich and Philippine islands; but there are notable exceptions in the Himalaya Mountains, the west coast of North America, the Mississippi and St. Lawrence valleys, and New England, where earthquakes are not uncommon even now, though they are far from active volcanoes. We may, perhaps, look upon the volcano as a safety valve, which prevents disastrous ruptures of the earth's crust. We now regard the earthquake shock as the passage of an earth wave, in which each particle in its course performs a vibratory movement —a sort of subterranean pulse. The vertical movements are far more destructive than the horizontal, the former being the *terremoto* and the latter the *temblor* of the Spanish. Since the comparatively solid character of the earth's centre has been adopted by physicists, the explanation of these movements has been sought in the cooling and consequent shrinking of this centre and the falling in of the crust; this immense crushing force, converted into heat, is sufficient to liquefy the adjacent rocks, which, by the agency of steam, are ejected as lavas, scoriæ, and dust from the volcano.

These terrible agents are not wholly bad, and by no means so destructive as is popularly believed. Japan and Java, populous and productive, are over volcanic centres;

Etna and Vesuvius are dotted with thriving villages and clothed with groves and vineyards. Between the two rivers which enclose Etna live 330,000 people, or 965 to a square mile, six times as many as in any other part of Italy; the soil at the base of Vesuvius is the most fertile in Europe, surpassing the suburbs of Paris, and equalled only in the vicinity of New York.

On the 3d of June, 1863, at 7.25 P.M., after a sultry day, and during the vesper service of Corpus Christi, a severe earthquake occurred; the roof of the cathedral fell in, burying a large part of the congregation in the ruins, many of whom were killed and hundreds wounded. The palace of the Governor-General was unroofed and his family narrowly escaped; every church, except that of St. Augustin, was rendered useless for the time, and several were completely destroyed; almost every building, public or private, suffered damage, though from improved methods of construction, taught by experience, the loss of life was comparatively small. The shock lasted only half a minute, but it was estimated that 400 persons were killed and over 2,000 wounded; the loss was put at $8,000,000. There seemed to be two waves, one from the south to north, and the other from east to west.

In July, 1880, after ten years of exemption, and when the country was remarkably prosperous, on the 18th and 20th came a series of very violent shocks, throwing the community into despair and terror, and paralyzing the progress of the province. It seems a question difficult to solve, whether the remarkable fertility of these islands, subject to atmospheric and subterranean disturbances, is not a lure to destruction.

In the time of the earthquake the thatched cottage is more precious than the mansion of stone, and a boat on the river than a palace on land. The volcanoes of Taal and Bulusan, long inactive, gave out much vapor; Mayon took an unwonted activity, with evident diminution of the shocks in the vicinity; though the connection between the volcano and the earthquake may not be fully understood, there can be no doubt, in this region, of its reality.

In the midst of this destruction the newspaper went to press in the middle of the street, as the safest place; the city was turned into a tented field, and the river and bay were densely peopled.

In the Philippines, as elsewhere in the Pacific, the Chinese are monopolizing most of the petty trades, and are bidding successfully for many important avenues of profit, in spite of the aversion of the Malays, the persecutions of the Spaniards, and the competition of other races; there are over 20,000 in the province of Manila. Their geographical position, and the prevailing monsoons, invite the immigration of the Chinese from the marine provinces on the N. W.; from the most ancient times, long before the coming of the Spaniards, there was extensive communication between the two countries; and there is abundant evidence that these islands at one time belonged to the Chinese empire.

Cunning, economical, the shrewdest bankers and traders in the East, they are gradually becoming masters of the Pacific by sea and land; Honolulu, Sandwich Islands, is little better than a Hawaiian Hong Kong; they are crowding out the Malay at Singapore, where they number nearly one-half the population. They have many vessels on the Pacific,

are fast learning the details of the carrying trade, have inexhaustible and accessible supplies of coal, and already are doing a large business between San Francisco and China.

The present geography of the Polynesian archipelago is not probably what it was in prehistoric times; man has doubtless existed on this earth hundreds of thousands of years, during which great geographical, perhaps continental, changes have taken place. The Papuan race, wherever it originated, is now widely distributed over the Pacific from Melanesia to the Philippines and the Feejees, and its migrations are best understood from a sunken continent, insular or connected with Australia and Asia.

Of the prehistoric races of East Asia the principal is the pro-Malay, probably the ancestors of most of the nations of Asia, Europe and America, including the Mongolian, which was so early separated as to have become a distinct branch. The Malays are the most widely scattered, being sea farers. Man may retrograde as well as advance; and the study of the Polynesian races, it seems to me, must commence from a remote pre-historic age, and consider the question whether a people, once the builders of the stone monuments of Easter and the Ladrone islands, have not in this area degenerated into the primitive type of the lake-dwellings. The existence of a sunken continent is indicated by the isolated groups of volcanic islands and the surrounding coral reefs, as maintained by Wallace and others.

A glance at the map of the world, or a globe, shows an unsymmetrical, or at least unexpected absence of a continent in the Pacific; the space between the Malayan peninsula and South America is very large in comparison with

that between South America and Africa; geographical fitness seems to demand a continent there, instead of the immense water surface dotted by hundreds of islands, most of them volcanic. As this is a sinking area, the conclusion is natural that subsidence has left nothing of the continent above the water but these archipelagoes.

The continent admitted, we place upon it a prehistoric race, which attained a high degree of advancement, which built the monuments of the Ladrone and Easter islands, and the mysterious structures of Mexico, Central America, and Peru, and perhaps the Pyramids of Egypt. Deformed skulls, the emblem of the phallus, and many religious ceremonies, are met with in these prehistoric regions, and also among the present Papuan intermixtures of Polynesia, who may be considered as the retrograde remnants of the people of the sunken Pacific continent.

The old races were in the habit of deforming the skull artificially, but from this we can gather no information as to their origin. The custom is world-wide, and appears rather a natural tendency of man, than an indication of community of origin or intercourse between races. The tulisanes, or robber Indians, are mostly deserters from the native army of forced conscripts, accustomed to the use of arms, fleeing to the woods to avoid taxation and military service, disinclined to labor, leading a free, wandering, and adventurous life. Their object is not wholly plunder, as they give freely of their booty to their neighbors.

This view seems not inconsistent with the accepted belief that the earth is now practically finished—that the continents and oceans were outlined from the earliest geological time.

The slow and long-continued movements of continents, as far as relates to present geographical features, began in the post-tertiary, and are traced far into the age of man. The subsidence of the Pacific coral islands is mainly in a line extending from Japan to Easter island and South America, in a southeast direction, over an area 6,000 miles long, 1 to 2,000 wide, and to a depth varying from 3,000 to 6,000 feet. The Australian continent probably once included New Guinea and its neighboring islands, with a deep sea between, analogous to the Gulf of Mexico and the West Indies, the Mediterranean and the Dead sea, and their included islands; most likely the Philippine, the Borneo, and Java groups were a part of the Asiatic land mass, and Madagascar of Africa.

The dominant people in Madagascar, the so-called Hovas, belong, in my opinion, to the descendants of the prehistoric pro-Malay race, who now inhabit the Pacific under the name of Malayo-Polynesians, whose ancestry once peopled the sunken continent, and who drove the black, crisp-haired African tribes into the interior, as the Tagals pushed the Negritos from the coasts of the Philippines. While Madagascar belongs geographically to Africa, ethnologically it is a part of Malayo-Polynesia; though its present masters are rather Malays, like the primitive New Zealander and Australian, than Polynesians of the Tonga, Philippine, and Hawaiian types.

The greatest elevating force being from the side of the deepest ocean, its volcanoes would appear along the immense fracture of the border of its sunken continent; their course, including the Ladrones, Carolines, Sandwich, Navigators, Society, Friendly, Feejee, Marquesas, and New Hebrides, is

very near the line of subsidence just mentioned, both having a general northwest and southeast trend. If Pacific depression means elevation elsewhere, Asia might have emerged as the island continent went down, with corresponding migrations of animals and man in the tertiary or post-tertiary period.

The healthful climate, inexhaustible fertility, commanding geographical position, and magnificent scenery of the Philippine islands, fairly entitle them to their local name, the "Pearls of the Orient"—they are capable of being made the brightest jewels in the Spanish crown.

THE CURRENTS OF THE PACIFIC OCEAN.

BY

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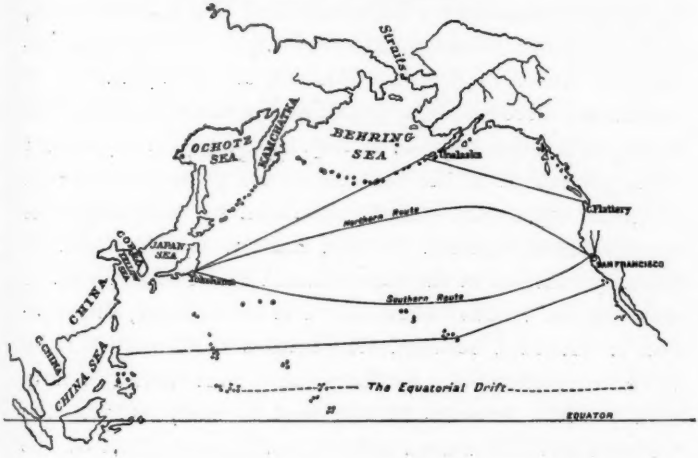
A complete consideration of the Pacific ocean would involve the study of very many other subjects than that which I bring before you to-night. Until very lately we

MAP A.

GENERAL MAP OF THE PACIFIC OCEAN



have accustomed ourselves to look upon our globe in a narrow and restricted way, to take it apart, as it were, and examine it by piecemeal, by which method very partial knowledge and unconnected details could only be ascertained. Even as regards the more particular subject of this essay, I could say but little exact concerning the grandest current

of all, the great substratum of our aqueous element, the southern current, as it is termed, derived from the melting snows and ice of the South Pole, which, finding its way by its density, gradually sinks beneath the surface of the deep waters of the southern hemisphere and subsides into the troughs and submarine valleys, and moving in its ocean bed slowly even as far as the North Pole. A knowledge of this current has only of late years dawned upon us, and for a knowledge of which we are indebted to our explorers and navigators; a work in which almost every civilized nation has contributed its quota. I have limited myself this evening to some remarks on the currents of the Pacific ocean, in its northern portion, and eminently to its principal current, the Kurosiwo,* or the warm stream of Japan.

Fritsche, director of the Imperial Russian Observatory at Pekin, in his essay on the climate of Eastern Asia, writes: "The greatest of all the currents in the Pacific ocean is that called the equatorial stream, produced by the differences in temperature between the pole and the equator, and by the daily rotation of the earth around its axis from west to east. In the Pacific ocean, north of the equator, this current is included between the parallels of 20° and 10°; its depth is considerable. In the ocean it runs almost exactly from Central America in the east to west, as far as the southern end of Formosa and the northern portion of the Philippine islands. There, near the tropic of Cancer, partly in consequence of rebounding against these islands, partly because along the coast of China from north to south there runs a cold current, the equatorial stream changes its direc-

* This name is spelled indifferently as one or two words by the Japanese, but always pronounced in the dialect of Tokio as one word, with the accent on the *s*, as Kurò̀skiwo.

tion and one part turns to the north, and near the latitude of 30° becomes divided into several branches." * (See Map D, p. 122.)

The origin and source of movement of the Kurosiwo or great warm current of the North Pacific ocean lies in the China sea between north latitude 10°–20° and east longitude 120°–130°. At that point the equatorial drift current is arrested in its westward course by being brought up against the Philippine islands, a range of submarine mountains having a trend nearly due north and south for eight hundred miles, and thus the stream has the direction of its current changed into a northeasterly course; mingling with the waters of the Philippine seas and those of the China sea it acquires an enlarged volume and increased temperature, and under tidal influences and conditions becomes a new current which has received the name of Kurosiwo, or "Black Current or sewer," a name given to it alike by the Chinese and Japanese. The cradle of this warm current is the China sea, which is shallow as compared with the ocean depths east of the Philippines and therefore easily heated up by the intertropical solar rays, having a yearly mean temperature of 80° Fahr. Owing to the new forces brought to bear upon it, it assumes a new direction which, according to the law of composition of forces, is to the north and east, and it is now, thereby, made subject to a new impelling force—the monsoons or the season winds of Eastern Asia.

In the pages of the "Chinese Commercial Guide," published at Hong Kong by S. Wells Williams, much information is given of the movement and navigation of the Chinese waters. From it is learned that the currents of the

* "Climate of Eastern Asia," by Dr. H. Fritsche, published by the North China branch of the Royal Asiatic Society.

southern coast of China are largely produced and influenced by the same atmospheric conditions as those which govern the Asiatic coast north of the tropic of Cancer, and of these the chief and most powerful are, as stated, the monsoons or trade winds, which blow with periodicity and force and tolerable regularity. Along these shores and stretches of the ocean where they blow unrestrained, their influence over the sea is uncontrolled, and after a few days, or sometimes even twenty-four hours, a well-established current appears and continues so long as the force of the wind predominates. When from any cause that force is lessened, the current of water loses its velocity and even ceases to move for a while; or from winds from either side rushing in, the current appears moving in a retrograde direction. These variable conditions of current are seen everywhere over this wide ocean, so that occasionally one doubts the existence of a current at any fixed point where it had been frequently met with, but all doubts vanish at another visit to the same place when it will be found re-established in its old direction. This observation will sufficiently explain the conflicting accounts given by mariners as to the existence or non-existence of a current at any special point, and we proceed to the further consideration of the influence of the monsoons.

These season winds blow with great force and regularity; the winter or northeast monsoon from 10th September to about 1st April, and the summer monsoon from mid-April to November. The influence of these two monsoons is very different upon the surface of the North Pacific. The southwest wind is the motor of the currents of the sea developing them and producing the circulation of its waters—it alone is usually termed *the monsoon.*

Wells describes this southwest current as flowing south of the point here described along the coast of Cochin China, from Pulo Obi to C. Padaran, and setting mostly to the east-northeast from April to the middle of October, and during the same period its direction is generally northward along the eastern coast of the Malay peninsula from Singapore strait to the gulf of Siam.*

Following up the south coasts of China sea these united currents run eastward and increase with the freshness and duration of the monsoon, varying from one to three and four knots per hour, from north latitude 10° to 14°, increasing in volume and strength and running from forty to sixty miles in twenty-four hours. When this current in spring, in passing along the Philippines meets with the equatorial drift, it mingles with it, carries a portion of the drift northward, and receives by it increased volume and warmth. Off Palawan and Luzon the current passes north in May, warm and running fifty miles per day, and accompanied by furious gusts and typhoons, produced by the warm sun of the China sea; it soon reaches the Bashi islands, in latitude 20°, and the south point of Formosa, which it rounds and travels up the east coast of that island, much of its current running between it and the Meiaco-Sima isles where the current in August is thirty to forty miles per day, without strong monsoons.

In May and June a broad warm current is found flowing around the shores of the Liu-Kiu islands and the Bonin islands, which it has already reached in April, producing variable winds before the monsoon was established in full influence. This current is felt off the shores of Japan, and has already received its Japanese title—the Black sea or cur-

* "Chinese Commercial Guide." By S. W. Williams. 5th edition, p. 208.

rent (Kurosiwo)—from the remarkable dark color which its waters exhibit when looking over the ship's side—it is a deep blue-black and it can be thus recognized with ease as soon as it is attempted to be crossed. The origin of this Kurosiwo, the great warm current of the Pacific, has been thus traced—cradled in the China sea, the offspring of the equatorial drift and its warm currents among the Philippine islands. When it passes Formosa in early summer, it is already a powerful current and begins to send off lesser currents while proceeding on its northern route.

Immediately north of Formosa, and between it and the Bashi islands, the first branch of the current emerges from its western side about the latitude of 30°, flows north by east, enters the eastern and Yellow seas, warming the western shore of Corea, and, losing its high temperature in the gulf of Petcheli, returns to the south along the coast of China as a cold current.

Another branch, a narrow one, is given off as the current reaches the southern shores of the Japanese islands, passes up through the Straits of Corea, warming the Sea of Japan both on the eastern side of the Corean peninsula and the western coast of the large island of Japan; passing farther north this current mingles with the waters of the Sea of Tartary and sends lateral currents eastward through the Straits of Tsugaru and of Lapeyrouse to intermix with the cold waters off the shores of the Kurile islands and of Kamchatka. On account of the frequent northwest wind blowing off the Manchurian shores this current is driven with violence through the channels between the Kuriles, and appears a greater body of water than it really is.

But the great body of the Kurosiwo keeps on the eastern side of Japan, reaching the islands of Kiu-Siu and Shikoku

in the south of that kingdom about the latter end of March or beginning of April, and soon after enveloping the Japanese islands completely on both sides in its warm waters, and pressing closer to the shores bestows its double Summer-rains and its consequent fertility from an atmosphere overloaded with moisture.

In early spring when the Kurosiwo arrives at parallel 30° north, it is but a narrow stream, being scarcely more than 100 miles wide at the Bonin isles, but rapidly as summer approaches the volume of water increases and the stream widens, until in July and August, and part of September, the influence of the Kurosiwo cannot be much less than 48 degrees wide, reaching as far eastward as 170° west longitude from Greenwich, or one-half the distance across the Pacific.*

The rate of motion of the Japanese current varies as the latter is near to land or farther out; in the open ocean, taken on the average, the current velocity is from 67 to 70 miles per day, rarely ever exceeding the latter amount. Among the Bonin isles, it is about 65 miles; opposite Kiu-Siu, Japan, 50–60 miles; off Cape King (main island), 70 miles; in the Corean straits and sea, 2–3 miles per hour.

Among the Bashi, Liu-Kiu and Bonin islands, even this moderate velocity meeting with obstructing winds and tides creates stormy waters, bad for navigation of small craft, and causes diminished velocity of current; and in Satsuma the violent forcing of the stream through the channels between Kiu-Siu and Shikoku during later spring is the terror of Japanese sailors.

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* See voyages 12 and 14 on Table of Temperatures, p. 126.

The Kurosiwo clings to the Japanese coast no further north than Cape Inaboye on the east side, where in latitude 38° it leaves the shore and takes a more distinctly eastern direction, apparently pushed out of position by the body of cold water coming from the sea of Ochotz and the western shores of Kamchatka. This latter current, known to the Japanese by the name of *Oya Siwo*, arises from the melting of the cold winter ice of the sea of Ochotz and around the island of Karafto; it flows southward to the Kuriles, and is forced by the cold northwest winds along the shores of Kamchatka and between the isles to the coasts of Hokaido and larger island of Japan. In extreme cold this region is frozen into an undistinguishable mass of compact ice frequently for twenty-one miles off the land. In this vicinity, in spring, from the west the Amour river pours large amounts of comparative warmish water into this unusually cold basin, which combined meeting with the freshly-arrived Kurosiwo, produces banks of fogs and rain, resembling the coast of Labrador and Newfoundland from similar causes. The Oya Siwo pursues its course south, along the Coast of Nambu, pushing, as already stated, the Kurosiwo eastward off land, and making coast navigation dangerous. From the middle of November to the vernal equinox the northwest wind blows off the Manchu coast with steady force, increased in the morning, lighter in the afternoon, frequently obscuring all traces of a current by reason of the cold sheet of water blown from Ochotz sea along the shores of Japan south as far as Tokio. Captain A. R. Brown, of the *Thabor* Japanese steamship, gives a striking illustration of the effect of the warm stream (Kurosiwo) and of the Oya Siwo cold stream, off

* Transactions of Asiatic Society of Japan, 1874, Yokohama.

the same coast of Japan, thus: "In April, 1873, sailing off Cape Inaboye, he found the sea temperature 62° Fahr.: in mid May following he fell in with the Oya Siwo and found the shore sea temperature had fallen to 42°." *

When leaving the shores of the larger island in latitude 38° the Kurosiwo washes the southeastern shores of Hokaido until it reaches cape Nimurro, the eastern extremity of that island, when it is deflected toward the southeast by the Kuriles, which blocks its further course northward and compels it to pass in parallels 45°–50° south of the point of Kamchatka to the Aleutian isles, where it bends to the southeast, sends some branches between the narrow pass of these islands into Behring sea, and in making its great curve to the southeast loses its distinctive character as a warm current and becomes the cool stream of the Pacific shores, as may be seen by examining the "Table of Temperatures" in the last five columns adjoining the San Francisco side.

No warm current flows north of the Kurile Islands along the Kamchatka shore.

Capt. A. R. Brown, of the Japanese Government Light House Service, in an interesting essay,* writes of it as a current of varying dimensions, its volume and breadth depending mainly on the winds of the China sea, being increased during southwest winds and lessened by northeast winds. The velocity of the current also is irregular and uncertain, varying from forty to seventy-six miles in twenty-four hours. He gives the following temperatures of the current around the Islands of Japan, as taken on the Japanese ship *Thabor :*

* Winds and currents of the Japan Islands in Transactions of Asiatic Society of Japan. Yokohama, 1874.

TABLE OF TEMPERATURES ON THE "THABOR."

MONTHS.	Between Satano Misaki and Oshima.	Between Oshima and Miko Moto.
January	65 F.	69 F.
February	62	61
March	68	64
April	70	67
May	74	70–76
June	78	76
July	82	76–78
August	80	82–84
September	...	.....
October	80–85	76–79
November	.....	.....
December	64–72	71

Tsugaru straits (between Hokaido and large island):—

April.....42
June.....56

Capt. Brown states that the branch passing through the Corean straits does not flow in winter, owing partly to the opposing influence of the northeast monsoon, and partly to the northwest wind blowing off the Manchuria coast and producing currents rushing through Tsugaru and Lapeyrouse straits.

The following Table of Temperatures of the Kurosiwo is made up from the maps appended to Dr. Fritche's essay, from which I have already drawn for other information:

Locale of Stream. (Latitude N. and Longitude East Gr.)	Month.	Temp., Fahr.
1. Off Keeling—(Formosa)	February	69.8
2. Longitude 140°—Latitude 33°	February	66.2
3. Longitude 142°—Latitude 35°	February	62.6
4. Tsugaru straits	February	50.
5. Northeast of Formosa, Longitude 126°.	February	69.8
6. Longitude 140°—Latitude 33°	June	77.
7. Longitude 137°—Latitude 36°	July	86.
8. Liu-Kiu	July	87.8
9. Longitude 156°—Latitude 44°	August	59.
10. Lapeyrouse strait	August	62.6
11. Corea straits	August	82.4
12. Tsugaru straits	August	75.2

Dr. Fritsche does not name the authorities on which these figures are given. The date of observation and locale of the current fixes the relative warmth of the current.

In crossing the Kurosiwo in summer, as in routes of the China Mail Steamship Company voyages, between San Francisco and Yokohama, when within 500 or 600 miles of the Japanese coast it is easy to recognize the Kurosiwo by its color and the floating drift matter; but it is not always easy at different times to recognize the width of this stream in the various months of summer, or where the borders of a stream, which is very liable to quick and great expansion

under high temperatures and strong winds, are placed. By examination of the table of ocean temperatures a rough guess may be hazarded, but to determine the lateral limits of a warm river flowing through a cooler ocean is a problem which will require frequent and patient observation before it can be correctly solved. This table, and the profiles submitted, are but the commencement of this work.

Temperatures of the Pacific Ocean.

The Pacific ocean is bluntly closed at the north by the approach of the Asiatic and American continents, which is almost complete at Behring strait. Telluric disturbances with its geological results, the upheaval of submarine mountain chains have aided in effecting this change of the earth's surface more than other causes. The disturbances which in America led to the formation of the Rocky mountains along the Mackenzie and Upper Yukon rivers, appear not to have extended west of latitude 157° (Greenwich), but to have been transferred to the northeastern portion of the Asiatic continent, where volcanic activity was greatly exerted and is still evident in the existing fire-islands among the Aleutians and Kuriles, and along the whole peninsula of Kamchatka, marking the course of its power and extent by the shore lines of its seas, and by the trend of its mountain chains, promontories and islands. An unbroken volcanic subterranean force may be traced in a direction northeast and southwest from the Upper Yukon on the Arctic circle to the extreme Aleutian isles. Another line or wave of force nearly parallel extends from the head of the Anadyr river in Eastern Siberia through Kamchatka to Cape Lopatka, passing into the Kurile islands,

which it has gradually elevated, then entering Japanese territory on its northern island (Hokaido), and passing to the extreme west of same, terminating on the Japan sea, where it meets another line of volcanic force of more ancient date and of more strictly northern direction which traverses the whole of Karafto, passing south through the west of Hokaido and under the large island of Japan, through Kiu-Siu and Shikok, where it is lost, perhaps to reappear in the Liu-Kiu islands. The mingling together of existing and extinct volcanoes, in the districts alluded to, point to the great extent of connected subterranean disturbance, embracing a line drawn from the Aleutian archipelago to the point of Kamchatka, and from that point by another line to Cape Nimurro, the eastern point of Hokaido; all these telluric upheavals give to the coasts approaching Behring strait, its broken continuity, and to the waters north of latitude 50°, an archipelagic condition.

Such great geological changes which this part of the earth has undergone has not been confined to the land only, but has extended along the ocean bottom, lifting it in places into high ridges or submarine mountains with corresponding deep valleys or troughs whose existence in the north Pacific has been clearly brought to light by the report of the soundings in this ocean, made by Captain Belknap in U. S. Steamship *Tuscarora*, both off the coast from San Francisco to San Diego and to Hawaii islands, as well as to the line of soundings taken by him from the Bay of Sindai, Japan, to the Kuriles, the Aleutians, and terminating at Cape Flattery, on the Oregon coast.* The deep longi-

* On Map A may be found the lines of Captain Belknap's soundings.

tudinal troughs in the ocean bottom, brought to light by the work on the *Tuscarora*, must exert great influence on the underflow of the great cold current already alluded to as flowing north from the South Pole, in turning it aside from passing into the Arctic ocean through the Straits, were it possible to do so (which it is not, owing to its present great shallowness), and forcing it to rise to the surface and form a portion of the great cool current flowing south on the American side of the Pacific, to finally mix with the equatorial drift at the tropic of Cancer, on the American side of the ocean.

Behring sea and waters contiguous may be considered at separated from the North Pacific by latitude 60° N. as its southern boundary, with latitude 70° N. for its northern limit, thus embracing in the strait and contiguous waters 10 degrees of latitude, and having the Arctic circle divide it into almost equal halves; having, where narrowest, a breadth of 49¼ nautical miles, with a depth not exceeding 27¾ fathoms. (See Maps B and C.)* Asiatic shore ice was seen at the times of observation by United States Coast and Geodetic Survey in August and September, 1880: Two small islands, the Diomedes, lie midway in the strait, dividing it into two channels. A warm oscillating current passing back and forth along the American shore toward Point Beechy, with a temperature of 48° Fahr. in summer, and a velocity of one foot per hour. This occurs only during warm weather. The Asiatic side was fringed with shore ice for a few miles out, and with its water temperature alongside at 37° Fahr., increasing to 45°–46° at the big Diomede isle without distinct current being observed. Arctic icebergs have not been observed within the straits; indeed it is too shallow to permit large masses of ice to pass through: one standing higher than twenty feet above water would have difficulty in brushing over the crest of the channel at side shallowest part, so that the straits are only a passage for broken shore ice and pack ice in spring and summer. Slow currents of moving water were observed passing in the warmest season of the year both northward and southward on opposite sides of the strait; but as Mr. Dall declares that there is an unobstructed flow of water

* For all accurate information of this intercontinental region I am mainly indebted to these publications from the pen of Professor W. H. Dall, who is the principal authority on all observations made on these coasts. Maps B and C are copied from the U. S. Geodetic Survey for 1880, Appendix No. 16.

through the channel for only ninety days in the year, it must be obvious that but a small amount of water from the Pacific can flow northward into the icy ocean. Indeed Mr. Dall, making a calculation, estimates the amount of water capable of passing north by this channel for one year would not fill a space having half the dimensions of Kotzebue sound. This incapability of these straits serving as an ample connecting link between the waters of the Arctic and Pacific, renders it only necessary to the arguments and facts of Professor Dall on this subject * to quote the passage from his report "No warm current from Behring sea enters Behring strait, with the exception of water from the neighboring rivers or adjacent sounds." This opinion coming from so eminent an authority as Professor Dall is final as regards these straits not forming a link between the two oceans; and if the connection of the ocean at the straits be null, the connection with the Kurosiwo south of the Aleutian isles is imperfect, the currents there being more probably purely tidal and capable of but little influence over either the temperature or the waters of Behring sea, the effect of whose efflux waters through the intervals of the islands is to cool the Kurosiwo.

As it might be interesting to know the physical appearance at such high latitudes as this in midsummer, a condensed extract from Appendix No. 16 is here added:

On Sept. 5th, Prof. Dall's party was off East cape. Broken ice lay close to shore.

With regard to the possibility of and the character of the herbage which this portion of the earth can sustain, Professor Dall relates that an exploring party on 20th August, 1880, anchored off Cape Lisbourne, on American shore, nearly 200 miles north of Behring strait; found the

* Coast Survey Report for 1880, Appendix, No. 16.

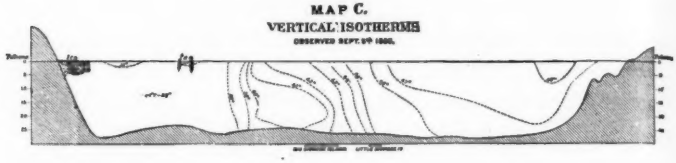
air balmy, the sun warm and bright; no snow or ice visible on land and water, and the banks covered with flowers, among which daisies, monkshood, and forget-me-nots were conspicuous. Next day sailed for Icy cape and found ice approaching the land with the north wind; at that time eleven miles off land; that night the ice moved in three miles toward land; moved on next day to the latitude of Point Barrow, to a point 50 miles west of it, where vegetation, also quite dense, existed there, but less profuse than at Cape Lisbourne, and with fewer flowers.

At a depth of two feet below the surface of the soil a stratum of ice was met with (not frozen soil) of unknown depth, covered with a bed of clay and vegetation. This ice stratum extends with few breaks as far north as Point Barrow; it extends also to the east, rising to six feet above sea level. It then runs south certainly as far as Icy cape, and in different localities down to Kotzebue sound. This ice layer was again met with near Elephant point on the south shore of Escholtz bay—about half a mile from the sea a ridge two miles wide and 250 feet high was chiefly composed of solid ice overlaid with clay and vegetable mould, the clay in some places being six or eight feet thick. Dwarf birch alder, 7 or 8 feet high, with stems 3 inches in diameter, and a luxuriant growth of herbage and berries grew with their roots less than a foot from perpetual solid ice; generally the ground was in other places covered with moss, this ground being several hundred feet above the sea, higher than any land round about it and older in geological position than the mammoth, and buffalo, and the fossil horse which once tenanted these lonely slopes.*

The section of the water in the straits shows that it is warmest on the American side, and cools gradually as

* Appendix No. 16, U. S. C. & G. Survey, 1880.

the Asiatic side is reached. The highest temperature shown was 48° Fahr. and36°. The the lowest vertical curves are here partly interfered with owing to the proximity of the Diomede isles, but are generally very regular. (See Map C. vertical isotherms.)



This examination of the temperature of the strait should clearly satisfy every observer that no cold current flows down in a body from the Arctic ocean, and that this shallow strait is an effectual barrier alike against it and any considerable current of warm water passing northward through the strait—any flow of warm water northward can only come from currents produced from winds or tides, both of which are powerful in the lower straits.

The Kurosiwo, east of 160° W. long., pursues its course south of the Aleutian islands along the parallels of 45°–47′ N. lat. with a southeasterly deflection, when it merges into and becomes an inseparable part of the drift current of the northwest coast of America. Important observations of this current have been made between Vancouver's island and San Francisco. In this long and curved course, the current has become altered in its thermic conditions, as stated previously; it is no longer the warm current of this ocean, as it was when it travelled along the Asiatic shores in warm latitudes; it has become, by commingling with the Behring sea waters and with the Alaska current, the cool current of the west shores of the continent, which it serves to chill so decidedly along the coast of Oregon and Washington

Territories, conferring a marked uniformity of climate as far south as San Diego, where the current has left the American shore and passed westward to mingle with the great body of the equatorial drift, to recommence its ceaseless round as the Kurosiwo.

An effort has thus been made to trace not merely a current but a circulation of warm water from the equator through the China sea, around the isles of Japan as far north as the Kuriles and the southern cape of Kamchatka, thence eastward and south of latitude 50°, toward the Aleutian isles, and from the promontory of Alaska to the shores of Sitka and Vancouver, nor is the idea of a circulating current a novelty ; it is an existing belief along the sea coast of China and Japan, and a tradition of the Spanish settlers of Mexico and California for three centuries.

The Japanese sea-going men are not only acquainted with the Kurosiwo, but know that in north latitudes it reaches American shores ; and I have learned, when in Kagoshima, the capital of Satsuma Ken, that it is no uncommon occurrence for Japanese and Corean vessels trading with Liu-Kiu to be compelled from stress of weather to put into that harbor, having been carried by the current several hundred miles to the north. Fishing boats and coast-traders going north to Nambu (Japan) from Osaka have been caught in the current during a storm and wrecked on the shores of Hokaido or the Kuriles. Greenhow* relates of the wreck of a Japanese vessel on the coast of Kamchatka in 1729 ; the same writer also states as a fact that two Japanese vessels under stress of weather have been driven on the west coast of North America since 1813.†

* History of Oregon and California. Boston, 1844, p. 128.
† Ibid, p. 6.

The late Lieut. Day, U. S. N., engaged in Japanese survey of Hokaido in 1873, had learned of a Japanese junk drifting from Liu-Kiu to Nimuro (Hokaido) where the sailors were taken off and cared for by the authorities—originally bound to Kagoshima, but overtaken by a typhoon, they were so completely wrecked that they drifted with the current, and were carried to the very eastern point of Hokaido, having spent six weeks of an autumn struggling with the current.

Historical Knowledge of Pacific Currents.

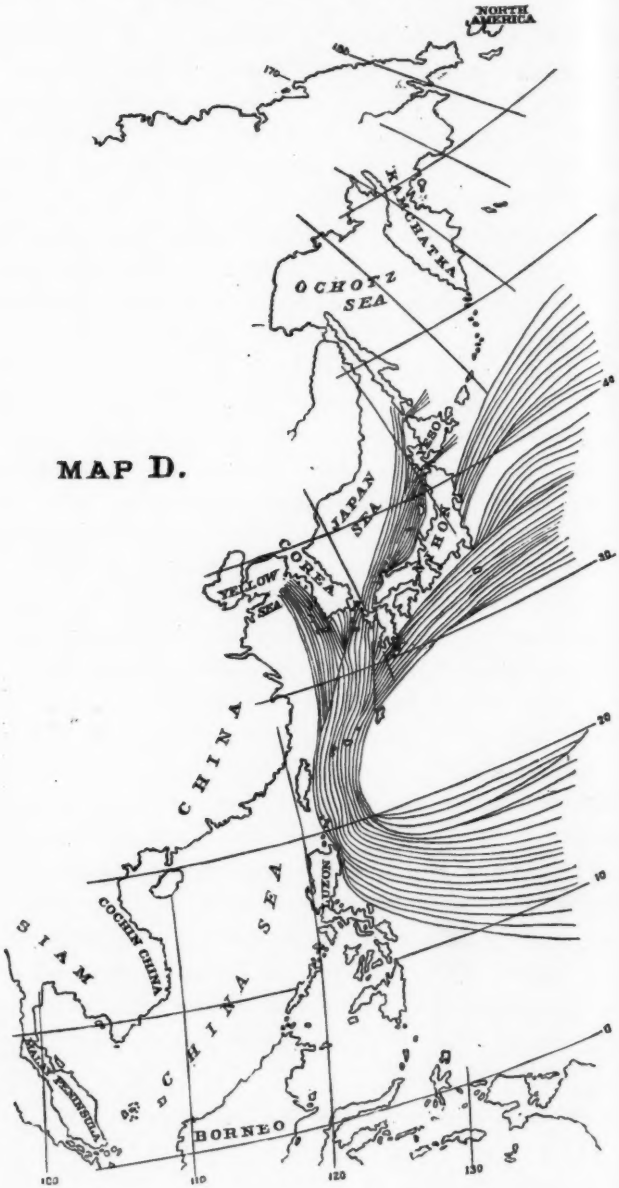
No sooner had the Spanish adventurers from Cuba under Cortez landed in Mexico and conquered the then powerful and wealthy empire, than the reports of metallic and mineral wealth which were sent back to Spain, brought out crowds of adventurers eager for riches and renown, and the desire to discover and open up new and short routes to the Indies and Moluccas filled the excited minds of many, and of none more than of Cortez himself, who had received a charter from his sovereign empowering him to conquer and discover any islands or other countries west of Mexico and not then subject to other powers. He attempted to build ships and fit out an expedition from the Pacific shores, but meeting with opposition from Nuño de Guzman, the then governor of the territory in vicinity of the present Tampico, he was delayed for nearly three years before three ships were ready for sea; finally, in the summer of 1532, Cortez sent two of these vessels out, with instructions to sail along the Mexican coast in a westerly direction. At that time the most northerly points along the coast known to these adventurers was Culiacan. Diego Hurtada de Mendoza, the leader of the expedition, sailed from Tehuantepec along shore as far as latitude 27° N., where, owing to hardship

and contrary winds, the crew mutinied and he sent the vessel back; the other vessel he himself assumed charge of and started out for new exploration. What became of the ship or of Hurtado was never known, and Cortez fitted out two more vessels for further voyages; in one of these another mutiny occurred, the officers were killed and the ship put in on the coast at Chamotla, in the present Xalisco, where she was seized by De Guzman. The other vessel, under Grijalva, went to sea, discovered the Revillagigedo isles and then, tossed about by the winds, returned without having discovered any new shores. Again, in 1535, Cortez fitted out a third expedition, sailed up the coast and took possession of the southern portion of the peninsula of California, as now known. This settlement was in latitude 24° N., where he remained for one year, when the settlers mutinied, many of the crew having died from want and scurvy and the few who survived cursed Cortez, his islands, his bay and his discovery.*

From their ignorance of the existence and direction of the powerful currents of the ocean they could not avail themselves of the fortunate winds which blew in their favor, and hence singularly unfortunate were all the voyages undertaken to explore the northwest coast of this continent, whether by Cortez, De Guzman, Mendoza, Ulloa, Grijalva or Saavedra; tossed about by variable ocean winds, driven in to shore when they kept too close to land, driven out to sea if they ventured out too far from the coast, they found the ocean anything but pacific. After being beaten back southward to the port they had left, they abandoned exploration by sea and marched inland, northward into the heart of New Mexico, suspecting that the Indies might be there.

* Bernal Diaz. Istoria de la Conquista de Mexico, ch. 129.

MAP D.


NORTH AMERICA
KAMCHATKA
OCHOTZ SEA
JAPAN SEA
YELLOW SEA
COREA
CHINA
COCHIN CHINA
SIAM
MALAY PENINSULA
CHINA SEA
BORNEO
PHILIPPINES
100
110
120
130

By the term "the Indies," the Spaniards of that day did not understand either Hindustan or Cochin China. To them the Spanish dominions in America, together with the Canary and the Philippine isles, formed one empire called the Indies, of which the King of Spain was *ex officio* the sovereign, and it was to gain that Indies that so many ventures were made to reach them by a shorter route and in which they were successful, for in 1564 the mother country (Spain) made another attempt to gain a footing in the so-called East Indies. Miguel de Legaspé was sent out from Mexico in that year with a small squadron for that purpose. He landed on the Philippine isles and subjugated them, and if he failed to discover India, he made another discovery of great value to the world.

Before Legaspé's day no one had ever crossed the Pacific from Asia to America; in this voyage, however, three of Legaspé's vessels, with Friar Urdañeta as captain, on leaving Luzon sailed homeward in a *northerly direction* up to latitude 40°, aided by the variable winds of these latitudes, where he finally fell in with the eastern border of the Japan current on its eastern course to Californian shores, and there by the strong northwestern current was quickly carried to Mexico.

This was their discovery, that by sailing southeast from Mexico they would reach the great equatorial drift current running westward and known to Magellan, which would carry them from Mexico to China—to the Philippines—or to Macao—and by taking a northward course homeward they would invariably strike the northern current and be safely carried to the Californian and Mexican coasts.* This dis-

* This course may be better understood by reference to Map A, which indicates the direction of the equatorial drift, and also to Map D, showing its conversion into the Kurosiwo.

covery enriched Spain and Mexico. Large ships, called galleons, sailed annually from Acapulco to Manila, to Macao, and the coast of Hong Kong, laden with precious metals and European merchandise, and bringing silk, spices, and porcelain for consumption either in Spain or America, and thus an extensive coast trade sprung up between the mother country and Panama, Peru, and Chili. These voyages were very long and very tedious; usually from Mexico to India took three months to accomplish, and seven months in the return voyage, with the chances of the crew being decimated by scurvy.

Yet long and tedious as they were, and fatal as the scurvy occasionally was, yet the glory and wealth which redounded to Spain, was deemed ample return, accomplished as it was with but trifling shipwreck or stress of weather, the sailing being in the track of the two great currents of the ocean, viz: the equatorial drift and the Kurosiwo.

Having resided for some years in Japan, and having been much interested in the meteorology and climate of that country, on my return voyage therefrom I was afforded an opportunity of studying the temperatures of the great ocean, by being permitted access—through the kindness of Captain Wm. B. Cobb, and Mr. Drinkwater, 1st officer of the Pacific Mail steamship *Great Republic* (to whom I here desire to return my thanks)—to transcribe from the log-books of the steamer, the records of the temperatures of the ocean during the trading voyages between San Francisco, Yokohama and Hong Kong, and the return trips.

As the ships of the P. M. S.S. Co. cross the Pacific every month, a favorable opportunity was thus afforded, not only of collecting information on the monthly variations of temperature throughout the year along the track of the

voyages made, but also of determining the variations of temperature along the lines of longitude, so as to ascertain what influence the various currents in the ocean had in altering or modifying the heating and cooling effects of the solar rays upon that large body of water.

As these voyages were made along a prescribed route, from which deviation is made only exceptionally, and which route embraced a band of water about 16° of latitude in mid-ocean, very accurate information could be obtained of the monthly temperatures for successive years of the same region of the ocean; from which the existence of currents in the ocean may be assumed with considerable show of accuracy. For although sailing across a given latitude does not yield much knowledge of the velocity or direction of a current, yet where the temperature shows marked vicissitudes it generally implies the existence of a different body of water intruded along the sailing line, which is a current, and as it was only superficial temperatures which are recorded in the logs, it answered that purpose satisfactorily.

No doubt the only direct information yielded is the knowledge of the actual superficial temperature of the ocean; but over so large a body of water as the Pacific there must be differences of temperature over and above the differences of latitude and season, and these differences imply different movements and different forces acting, produced by strong winds, melting ice and solar heat. These three influences are shown very markedly upon a study of the table of temperature of the Pacific ocean taken on board the Pacific Mail Steamship Company's steamers in their trading voyages across the ocean between San Francisco and Yokohama, and their return trips, hereto annexed.

TABLE OF TEMPERATURES OF THE NORTH PACIFIC OCEAN.

Occurring on route of Voyages of Pacific Mail S. S. Co. Ship *Great Republic*.

Yokohama.		East Longitude.														West Longitude from Greenwich.															San Francisco.		Voyage No.
Date.		140	143	146	149	153	155	158	161	164	167	170	173	176	179	178	175	172	169	166	163	160	157	154	151	148	145	142	139	136	133	130	127	124		Date.	
Feb. 6, '73.	Ar.	62	63	64	66	67	67	68	68	65	67	68	66	....	65	64	63	65	63	63	63	62	64	63	63	62	60	60	58	57	56	54	53	Bd.	Jan. 5, '73.	1
Feb. 1, '75.	Ar.	62	66	64	64	65	66	66	66	67	66	67	67	....	66	66	66	64	64	65	65	64	66	67	66	66	66	64	63	62	61	53	52	Bd.	Jan. 2, '75.	2
Feb. 24, '74.	Bd.	62	65	63	62	62	62	62	61	62	61	67	66	....	64	64	59	59	59	60	59	57	57	59	58	57	56	58	58	57	56	55	53	53	Ar.	Mch. 18, '74	3
Mar. 11, '73.	Bd.	61	64	62	62	60	62	63	63	62	61	60	62	....	63	63	61	62	62	63	61	61	62	63	63	62	62	62	61	60	59	58	54	53	Ar.	April 3, '73.	4
April 27, '74.	Ar.	60	64	63	64	63	62	62	64	61	61	61	61	....	56	57	55	57	55	59	60	59	55	57	59	60	60	60	60	59	58	55	55	54	Bd.	April 1, '74.	5
May 26, '73.	Ar.	70	69	67	65	64	64	66	66	61	61	60	59	....	60	60	60	60	60	59	59	57	58	57	59	59	60	61	60	60	61	57	56	53	Bd.	May 1, '73.	6
May 25, '73.	Bd.	68	68	67	66	64	64	65	61	65	65	63	63	....	63	59	59	59	60	59	59	60	62	64	66	65	65	64	61	61	60	58	56	55	Ar.	June 17, '73.	7
†May 23, '74.	Bd.	62	63	64	67	67	61	60	60	60	59	58	59	....	59	58	57	57	56	56	55	55	55	54	56	54	54	54	58	59	60	60	59	58	Ar.	June 15, '74.	8*
June 24, '75.	Bd.	72	74	73	73	71	69	69	68	70	73	70	73	....	74	73	72	70	70	68	68	67	67	68	69	69	69	67	65	64	63	61	60	55	Ar.	July 16, '75.	9
July 30, '74.	Ar.	73	77	76	76	76	76	74	73	70	71	73	73	....	71	71	70	69	68	67	67	68	67	67	68	64	64	63	63	63	62	61	61	57	Bd.	June 27, '76.	10
July 24, '73.	Ar.	81	77	78	77	75	76	75	74	75	75	73	73	....	73	71	73	72	67	67	66	67	67	67	68	66	67	66	65	65	63	62	56	55	Bd.	July 5, '73.	11
†Aug. 26, '75.	Ar.	80	80	78	81	80	79	80	79	76	78	77	76	....	77	76	75	75	75	73	72	71	71	73	72	70	71	71	68	66	64	63	61	55	Bd.	Aug. 2, '75.	12
*Aug. 14, '74.	Bd.	80	83	78	77	75	64	58	60	57	56	55	55	....	55	55	55	55	55	57	60	60	61	61	62	63	63	63	64	64	64	65	63	62	Ar.	Sept. 3, '74.	13*
†Aug. 28, '72.	Bd.	80	82	79	78	76	76	76	75	76	77	76	76	....	73	73	73	73	74	74	74	75	75	75	74	74	73	73	72	70	69	68	67	56	Ar.	Sept. 12, '72.	14
Oct. 9, '73.	Ar.	....	75	74	73	74	75	78	80	80	76	73	70	....	69	69	69	69	70	69	70	70	71	73	74	74	74	74	73	71	69	68	64	62	Bd.	Sept. 18, '73.	15
Oct. 25, '71.	Ar.	....	76	76	76	76	76	77	79	79	79	79	78	....	77	78	78	77	77	77	78	79	79	79	78	77	75	73	70	67	66	66	65	62	Bd.	Oct. 1, '71.	16
Nov. 2, '73.	Bd.	68	73	72	71	71	72	73	73	72	69	72	71	....	67	66	66	66	66	65	63	63	63	63	63	64	64	66	67	68	68	66	60	56	Ar.	Nov. 20, '73.	17*
Nov. 25, '74.	Bd.	72	73	70	72	72	72	75	73	73	73	73	73	....	69	69	69	69	69	69	69	68	68	67	67	66	66	65	64	63	62	60	56	Ar.	Dec. 18, '74	18
Nov. 25, '71.	Bd.	66	68	71	72	74	70	73	72	71	71	70	69	....	67	66	66	65	65	65	67	66	66	67	67	68	68	66	65	64	60	59	53	50	Ar.	Dec. 15, '71.	19
Dec. 23, '72.	Ar.	63	66	67	70	69	68	70	71	70	70	69	70	....	68	69	69	69	69	69	70	72	68	69	70	70	71	68	68	66	63	64	60	Bd.	Dec. 1, '72.	20

Through the kindness thus extended toward me, I was enabled to obtain complete returns of the temperatures of twenty-four voyages made by that ship, which are tabulated so as to show the temperature on every third meridian on the sailing line. Twenty of these voyages are recorded in the table. The Asiatic shore (Yokohama) being placed on the left side of the sheet and San Francisco on the right; on each side are recorded the dates of sailing (Sd.) and arrival (Ar.) of each voyage. The sailing line is nearly on an even parallel, the latitude of Yokohama being 35° 27′ N. and San Francisco being 37° 30′ N. To obtain those figures daily averages of the temperatures recorded in the log-book were struck, and these daily means were transferred to the table. The majority of these trips were made on the southern route, which reached in its most southern part latitude 30°; the few on the northern route *are marked with an asterisk* and reached occasionally to 46° N. latitude.

The table of temperatures of the North Pacific ocean here submitted is drawn, as stated, directly from the logs and arranged for comparison on every 3d meridian. The fractions of a degree are either omitted when slight, or raised to the next degree to avoid complexity in calculation while not materially altering the correctness of the results.

I have also added five profiles of the temperatures in degrees of Fahrenheit along the sailing lines across the ocean for every month, in which the curves of temperatures are graphically shown and the difference of the temperature of the seasons can be distinctly appreciated.

The seasons along the coasts of the North Pacific are not to be reckoned as four in number each of three months duration; they are governed wholly by the monsoons and are

really divisible into two, as winter and summer, the length of which vary in proportion to the latitude.

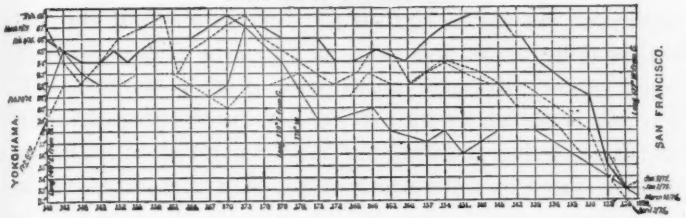
The arrival and departure of seasons over the Pacific ocean is very different from that in the case of the Atlantic. Having no outlet for its waters in the north, the Pacific is not warmed by the rapid flow of a large body of warm water flowing into the Arctic seas, but by the travel of a wider and shallower stream meandering in a circular path and adding the warmth of intertropical waters to modify the cold of Arctic latitudes. Thus the warmth of the Pacific in latitudes above 50° is derived from the connected currents crossing from west to east,* and from shallow sea bottoms of the Aleutian seas and archipelago of the Northwestern Pacific, warmed by solar radiation. The vast central area of the great ocean is warmed by solar radiation alone; its surface kept in constant movement equalizing its temperatures; and prevented as it is from being cooled down by the fact that no great icebergs come down through Behring straits or sea; and finally because the Kurosiwo in early summer moderates the cold of the Oya Siwo formed by the melting of the ice waters of the sea of Ochotz, the warmth of September and October lingers into the following spring.

In order to understand the cause and variation of the temperatures of the Pacific ocean it will be necessary to compare the table of the twenty voyages of the ship *Great Republic*, in which the temperatures of every third meridian are set down, with the diagrams of the same voyages arranged by months, and to consider these latter by the amount of deviation from the condition of most perfect equilibrium of the ocean. If attention be directed to voyages Nos. 3 and 4 (see profiles) it will be seen that the uniformity of

* *i. e.*, from Asia to America.

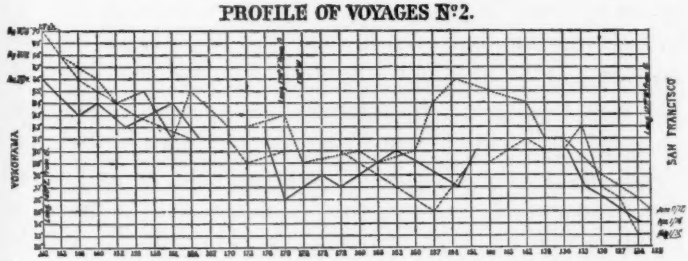
temperature is greater along these two lines than on others. Along the line of voyage No. 5 the temperatures from meridian 179 W. Long (Gr.) to American shore are also lower, but the temperatures on the Asiatic half are somewhat increased.

PROFILE OF VOYAGES Nº 1.



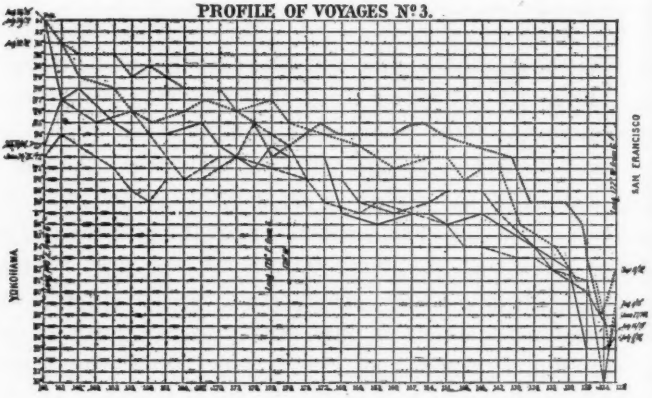
In fact the northern movement of the current is shadowed forth in the slightly augmented temperatures along meridians 140° to 149°. Voyages No. 4, therefore, may be accepted as representing those temperatures of the ocean when it is unmoved by any warming or cooling influences; the mean temperature of the voyage is 60°.1 Fahr., which may be looked upon as the mean temperature of the latitude of the sailing line. As the temperatures of the first twenty degrees is slightly above this figure, it would appear that the ocean had not time or opportunity to cool down to the normal figure throughout the winter before the warm current of the next spring makes its appearance at the

PROFILE OF VOYAGES Nº 2.



locality. April is the month when the current makes itself evident in latitude 35° on the Asiatic side.

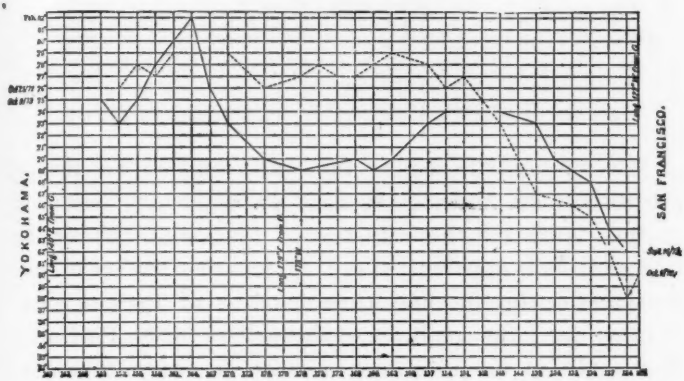
Voyage No. 5, which started from Yokohama, April 1, 1875, experienced no warm waters until approaching Japanese shores, when, under meridian 149°, the temperature of 64° was encountered, with slightly elevated temperatures, until port was reached; thus the first approach of the current is along shore, and each month, as a greater body of warm water advances north with greater warmth, this warmth is shown by its extension seaward; thus, in May and June the increased volume and temperature of the Kurosiwo is shown by the warmth extended farther out to sea, as



far as 160° east in May. June is not a summer month on this sailing line, but even in June the Kurosiwo is felt as far east as 175°, although I doubt if a current flows east of 175° east longitude. By reference to the general map on page 101, this will be seen to be the meridian of Behring strait, and on the "Table of Temperatures," as well as on the diagrams of voyages, this meridian will be found a dividing line, all high temperatures being on the Asiatic side of that meridian.

Summer in Japan is represented by the months July, August, September, and sometimes half of October; summer is late and protracted. The season is similar along the Chinese coast, and is exemplified on the "Table" by

PROFILE OF VOYAGES N°4.

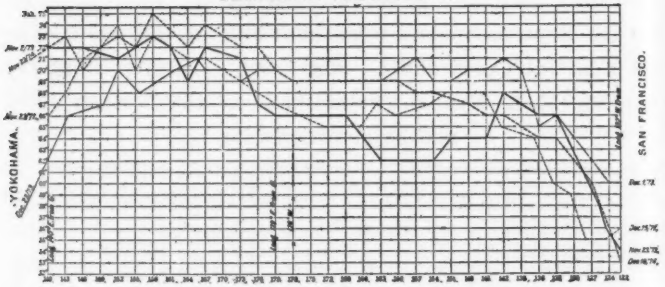


Voyages 11, 12, 13, 14 and 15, and by profiles Nos. 3 and 4. Voyage No. 14 illustrates the most heated condition of the Pacific waters; but even in the summer months, temperatures above 70 are not found east of meridian 136°. The melting ice waters of Behring's sea, Kamchatka, and above 55° north latitude, make themselves apparent in the "Table" and profiles by the lower temperatures in mid-ocean and toward America, where this cooling agent flows across the Kurosiwo, then running toward Vancouver's island, and reducing summer temperatures down to 60° Fahr.

Voyages 8 and 13 were made along the northern route, sailing part of the time along parallel 46, and shows the differences of temperatures between latitudes 31 and 46.

The waning power of the Kurosiwo is indicated in Voyages Nos. 16, 17 and 18 (see profile No. 5), where temperatures of 70 are not found on leaving the California coast after October 1st, until Meridian 177° is reached. In the months

PROFILE OF VOYAGES Nº5.



of November and December the warm current has disappeared between latitudes 30° and° 40, the whole ocean is cooling down, and the influence of the Asiatic shores as refrigerators is apparent; the N. E. monsoon has set in and continues during the first three months of the new year to bring down the condition of the surface of the Pacific to that condition of equilibrium in which no warmth is communicated from the air to the ocean. The S. W. monsoon has ceased to blow and the Kurosiwo as a current disappears, although its warming and equalizing diffusion continues in a mild way.

Such is the sketch of the currents of this great ocean which I have endeavored to place before you—slight and imperfect it necessarily is, needing further and more minute observation to be fully comprehended. But I have endeavored to clearly describe the two peculiarities of the Pacfic ocean, namely:

First.—That the warming influence of the North Pacific is the Kurosiwo or the Japanese current, which encircles this vast expanse of water; the motor power of which is the southwest monsoon, blowing from April until October.

Second.—The North Pacific ocean has, practically speaking, no northern outlet; Behring strait is but a *cul de sac*, and is no real gate of entrance into the Arctic ocean.

REMARKS EXPLANATORY

AS TO

"THE SUN, PLANET AND STAR INSTRUMENT."

BY

HORATIO ALLEN, Esq.

There are some in this audience who, knowing of me in connection with bodies holding fixed position on the face of the earth, or in motion over its surface, or through its waters from continent to continent, will ask, How is it that, at this late day, Horatio Allen, of engineering antecedents, has given attention to bodies holding fixed position in the heavens or in motion through space?

I may be excused for giving a moment to this question. I am not here with any antecedents of astronomical character. I am and have been only a learner, one of the great body of learners; it was as a learner that the first movement was made in the direction that has placed me this evening before you beside this little instrument.

It is nearer sixty years than fifty, when my educational years were drawing to a close at Columbia College in this city, when its building still stood beneath the shade of the great sycamores at the foot of Park Place. I was about to close those years without the clear conceptions of the universe that I felt I ought to have attained, and I had a strong conviction that in some good degree it was because there had not been provided that aid to the mind that could be had by a presentation to the eye of the points, lines, angles and planes in which the great facts and rela-

tions exist in space, and as appeared to me could probably be presented on a scale.

My apology for occupying any time with these personal reminiscences is that they are in part explanatory of the object of the instrument.

In the study of geometry, I had had the aid of the sheets of paper on whose plane surface were presented to the eye the points, lines, angles and figures, the relation of which form geometrical knowledge. Subsequently came another geometrical subject under different circumstances; conic sections, sections of the surface of a cone by different planes, presenting an angle and the four great curve lines. These not being in the same plane could not be truly presented on the same plane surface; but no means were provided whereby the intersection of the surface of a cone and the angle and the four great curves were presented to the eye. It seemed to me that if the intersection of a cone was to be the subject of study, there should be presented to the eye the intersection as it occurs. And with this feeling I sought a turner; I had a cone made, and the intersections being made, my mind had the aid of the eye to clear conceptions on this interesting subject. Now there is no well provided school where the subject is taught which is without that aid.

STUDY OF ASTRONOMY TO BE AIDED BY PRESENTATION TO THE EYE.

In its turn came the study of astronomy, based on the knowledge of the points, lines, angles and planes as they exist in space and are observed from the surface of the earth, itself subject to a three-fold change of position, but

no provision existed whereby the aid of the eye could be had.

Of the value of that kind of aid I had had personal knowledge, and it was a direct thought that aid of that character would be of special value in attaining clear and full conceptions as to the great facts and relations in astronomy.

But it was too late for me to undertake then the difficult task. The years of avocation were at hand; but I made a promise to myself that when the years of avocation closed, if ever they did close, I would take up the subject.

Nearly fifty years passed before the years of leisure came, but I had not forgotten my promise. How could I forget it when on every clear night that I looked at the heavens, I felt that I was not seeing them understandingly?

I did not forget that long-ago promise, and the result is the instrument before you, which I do not hesitate to say, and I say it gladly in this presence, meets every condition of presenting truly to the eye every important relation that exists, and every line defined by its angles, that can be observed by angle-measuring instrument in the parallel of 40 N., very nearly the parallel of the city of New York.

Many hours are necessary to make good this comprehensive statement. I can only hope in the sixty or ninety minutes at my command to make them good in some important particulars. One circumstance is unfavorable to the object that I have in view at this time, that I am to call the attention of many, some of whom are not as near as should be, to the several parts of an instrument designed specially for the study of one person.

Being of those who consider study, personal study, the source of all well-defined attainment, it was for the table

of the learner that the instrument has been devised, and it is of necessity to that instrument that I am about to refer.

CLEAR CONCEPTIONS AS TO THE GREAT FACTS AND RELATIONS NOT DIFFICULT OF ATTAINMENT.

But before directing your attention to the instrument, I will present certain facts, which, duly considered, will meet in a great degree the general impression that clear conceptions as to astronomical knowledge are of very difficult attainment; that special antecedent knowledge, geometrical and mathematical, is necessary, and in some degree special fitness for such attainment. All such impressions will be found entirely erroneous, when the great facts on which that knowledge rests are presented as they exist in space, and the mind is aided, as it may be, by the eye.

ONLY FIVE OF SIX THOUSAND BODIES SEEN IN SPACE ARE IN MOTION.

First, I recall to your mind the fact that of the six thousand bodies to be seen in the heavens, on some nights during each year, *only six are in motion*—the moon and the five planets, Mercury, Venus, Mars, Jupiter and Saturn. All the others hold fixed position in space, and being to the unaided eye entirely without motion, *there are no motions to be studied.*

What is to be studied? Only the manner in which the relative position of lines to them from the centre of the sun, the centre of the earth and a centre of observation in a known parallel of latitude on the surface of the earth is defined, each of which can be plainly presented to the eye in the case of any one star, and that being known of one

star, the manner in which the position of lines to the fixed star is defined and is readily extended to all the others.

Next, as to the five planets that are in motion, recollect that their motions being in planes at known small angles with the plane of the earth's orbit, are readily presented when the plane of the earth's orbit is plainly and truly presented to the eye. Next, that two of the planets having their orbits interior to the orbit of the earth, the study of the phenomena of one is the study of the phenomena of the other, and the orbits of the other three being exterior of the orbit of the earth, the study of the phenomena of the one is the study of the phenomena of the other two.

Thus the attention is directed to the study of one star and the study of one interior planet and of one exterior planet, which studies consist in the *apprehension of what is plainly and truly presented to the eye.*

THE VERTICAL LINE AND THE LINE TO THE NORTH STAR ALWAYS AT COMMAND.

Next I have to remind you that there are two lines ever present to determine the position of instruments of observation, and that are of special service in determining the position of the instrument I represent, and make it possible so to place it that the facts and relations to be presented shall be truly presented.

First, the vertical line ever present by a plumb line, which, extended downward, goes to the centre of the earth, and extended in the opposite direction, is the vertical line, and which line defines, by the plane at right angles to it at the surface of the earth, the plane of observation as presented in the instrument; and, second, the line to the north star, so nearly a fixed line in space that, as observed by the

eye, not aided by the telescope, it holds and has ever held the same position; and recollect that if the line to the north star is intersected at the same point by a vertical line, and a line at right angles to the vertical line, in the plane of the two lines, the angle made by the horizontal line with the line to the north star is the angle had when from 90° is subtracted the angle of latitude of the place of the vertical line, and the plane of the three lines is in the north and south plane of the place of the vertical line.

OF THE SIX THOUSAND BODIES VISIBLE TO THE EYE, WITHOUT TELESCOPE, ONLY SIX HAVE VISIBLE SIZE, ALL THE OTHERS ARE SEEN AS BRIGHT POINTS.

Next I call attention to the fact of great interest in the construction of the instrument on a scale, viz.: that of all the bodies seen in the heavens only two have visible size to the eye without the use of the telescope—the sun and the moon. All the others are seen only as points of light, and when telescopes of great power are directed to them, all but five are still only seen as bright points of light, the five exceptions being the planets Mercury, Venus, Mars, Jupiter and Saturn.

PRACTICABILITY OF THE INSTRUMENT.

The instrument is therefore true to observation, when points are taken to present the planets, and to make the reference complete the sun is referred to by its centre point, and thus all distances are between points, and being on the same scale, relative distance can be truly presented, and as angles are the same on all scales, the practicability of the instrument for the object in view is established.

In the pamphlet which I hold in my hand of some sixty

pages is a description in detail of the construction of the instrument explaining in succession the means to be used for the object in view, and instructive as to the use to be made of the means thus provided.

Time does not permit a reference to its pages.

Description of the Instrument Commenced.

Pamphlet Descriptive.

The instrument, as you see, consists of a base carrying a standard 22 inches high, adjustable by screws to a vertical position. Its head-piece carries a brass rod (called the central rod) $\frac{1}{2}$ inch in diameter, 13 inches long, at an upward angle of $16\frac{1}{2}^\circ$ with an horizontal line, the line at right angles to the vertical line.

Point representing centre of the sun.

At the end of the $\frac{1}{2}$-inch rod extends a rod $\frac{1}{8}$ of an inch in diameter. On this $\frac{1}{8}$-inch rod is a circular cut $\frac{1}{10}$ of an inch from the end of $\frac{1}{2}$-inch rod, the centre line of $\frac{1}{8}$-inch rod is the extension of the centre line of the $\frac{1}{2}$-inch central rod. In the $\frac{1}{8}$-inch rod and at the circular cut is the point that represents the centre of the sun.

The instrument when studied is to hold the position at which the centre lines of the standard and of the $\frac{1}{2}$-inch central rod are in the north and south plane of the place where the instrument is studied.

When so placed, the central rod will be at an angle of $23\frac{1}{2}^\circ$ with the line to the north star, and being in the north and south plane of the place of the instrument, there is presented in the instrument a line passing through the point representing the centre of the sun, that is *parallel to the axis line of revolution* of the centre of the earth when moving in space round the centre of the sun.

POINT PRESENTING THE CENTRE OF THE EARTH.

In order to present the centre of the earth in its relation to the centre of the sun, and in its motion round the centre of the sun, the central rod carries an arm A, which carries a rod, the point of which is at a distance of 11½ inches from the centre of the sun, and the line from that point to the centre of the sun is at right angles to the axis line through the centre of the sun, as described above.

The arm A is movable on the central rod by combinations that provide that the arm is always *at right angles to the central rod*, and thus as the arm A is moved in revolution, the point of the rod carried by the arm A is always at a distance of 11½ inches from the centre of the sun, and the line from the point of the rod to the centre of the sun is always at right angles to the centre line of the central rod.

SCALE OF THE INSTRUMENT.

Now, if 11½ inches is taken to represent in the instrument the mean distance from the centre of the earth to the centre of the sun, each inch in the instrument must represent eight millions of miles, and for the reason that the mean distance from the centre of the earth to the centre of the sun is taken at 92,000,000 of miles, and 92,000,000 divided by 11½ has 8,000,000 as quotient, therefore the scale of the instrument is that each inch represents 8,000,000 of miles.

To present clearly where the point is that presents the centre of the earth, a small ball is provided to place over the point, and to present the line from the centre of the earth to the centre of the sun is provided an elastic thread that can be stretched from the centre of the earth to the centre of the sun.

The ball and thread being in place, and the arm A being moved in revolution eastward, there is presented the line in which the centre of the earth moves round the centre of the sun, and the thread from the centre of the earth to the centre of the sun being always in the same plane will enable the mind to apprehend the position of the plane known as the plane of the earth's orbit.

PLANE OF THE EARTH'S ORBIT.

As the centre of the sun is the great centre of reference in defining position, so the plane of the earth's orbit passing through the centre of the sun is the great plane of reference.

To aid the mind yet more clearly to the conception of the position in space of the plane of the earth's orbit, there is provided at the end of the central rod, a metal plate, the plane surface of which is at right angles to the centre line of the central rod.

To this metal plate is attached closely a thin sheet of paper, and the elastic thread from the centre of the earth to the centre of the sun is as near as may be in contact with the plane paper surface.

VISIBLE LINE, MATHEMATICAL LINE—VISIBLE PLANE, MATHEMATICAL PLANE.

Now, as the visible line on a plane surface makes known to the mind the place of the mathematical line not visible, so the thin sheet of paper in contact with a plane surface makes known to the mind the place of the plane not visible, and the sheet of paper may be referred to as the plane, in the same manner that the visible line is referred to as the line.

With this understanding the sheet of paper on the metal surface, the plane of which is at right angles to the axis line of the central rod, will be referred to as the *central part* of the plane of the earth's orbit.

Any lines drawn on that surface from the centre or otherwise are to be considered as in the plane of the earth's orbit, and as the lines in that plane can be considered as extended indefinitely in extent in all directions, so the plane can be considered as extended in all directions.

It is of interest to note that when the astronomers, at the time of Copernicus, lost the imaginary advantage of making their observations from a *motionless* body, the fact of the motion of the earth round the centre of the sun in a plane passing through the centre of the sun, determined the great plane of reference in the new and true system; and the fact of the rotation of the earth determined by the incident of equal night and day at the same two places in the earth's orbit, determined the line of reference in the plane of reference, the line from the centre of the earth at the day of equinox to the centre of the sun.

This line is marked on the plane of the earth's orbit as the line of equinox.

Thus are presented in the instrument, in connection with the great centre of reference, the plane of reference and the line of reference, and by these means can be defined the relative position of any line from the centre of the sun to any object in space.

Thus I have endeavored to lead the mind to the conception that the plane of the earth's orbit in the instrument is *parallel* to the plane in which the earth is in motion round the sun. To this is to be added that in reference to the vast distances to the fixed stars, the plane of the earth's

orbit on the instrument may be considered without any error as in the plane in which the earth moves round the sun, as on the scale of the instrument the distance from the place of the instrument to the centre of the earth is less than $\frac{1}{2000}$ of an inch.

With this conception of the position in space held by the earth's orbit in the instrument, conceive also that there is nothing intervening between the instrument and the heavens, and that the night is clear, it would be seen that by extension of the plane as presented to the stars, it would pass through certain constellations which could be named, and is in known relation to certain fixed stars which could be named, thus defining its position in space by reference to stars holding a fixed position in space.

Thus you would rise to the first great conception as to the relative position of bodies in the universe. All space would be divided by the plane of the earth's orbit into two great halves, and bodies would be defined in position by reference to the great plane, each body would be in space either north of the plane, or south of the plane, or in the plane.

ANGLES OF LONGITUDE AND LATITUDE.

If the line to the object is in the plane of the earth's orbit, it will be seen by reference to the plane in the instrument that it is at a certain angle with the line of equinox, the line of reference in the plane, from the same point.

THE CIRCLE OF DEGREES OF LONGITUDE.

To present the angles made with the line of equinox, a circle of degrees having its centre at the centre of the sun is drawn on the plane of the earth's orbit, the degrees being marked from the line of equinox.

Thus when the line to a body from the centre of the sun crosses the line of degrees, at the mark 30 degrees, the position of that line is known by its angle of 30 degrees.

The angles with the line of equinox are called *angles of longitude*, and the circles of degrees the circle of degrees of longitude.

If the line to the object be above the plane of the orbit of the earth, it is at a certain angle with that plane.

To present that angle a line is drawn in the plane of the earth's orbit, presenting the line in which a plane passing through the line to the object and intersecting the plane of the earth's orbit at right angles ; that line is called the *line of intersection.*

The angle made by the line to the object with its line of intersection defines the relation of the line to the plane of the earth's orbit ; that angle is called the angle of latitude ; north latitude of the object is north, south latitude of the object is south, and the angle made by the line of intersection with the line of equinox is the angle of longitude of the line to the object, always reckoned eastward.

To present the angles of latitude and longitude on the instrument there is provided a steel wire, which can be adjusted to extend from the centre of the sun at an angle of $16\frac{1}{2}^\circ$ with its line of intersection in the plane of the earth's orbit and its line of intersection at an angle of $112\frac{1}{2}^\circ$ with the line of equinox, thus presenting the line to a star, whose latitude is $16\frac{1}{2}^\circ$ N, and longitude $112\frac{1}{2}^\circ$ E., the latitude and longitude of the star Castor in the constellation of the Twins.

In the same manner can the steel wire be adjusted to present the latitude and longitude of any star within certain limits that are allowed by the construction of the instrument.

DISTANCE TO THE FIXED STARS.

Next as to the distances to the fixed stars. They cannot be presented in the instrument, as the distance to the nearest star, Capilla, is 224,000 times the distance from the earth to the sun. By reference to the instrument some relative idea can be given of this vast distance.

The distance from the earth to the sun, as presented on the scale of the instrument and in the instrument, is $11\frac{1}{2}$ inches; $11\frac{1}{2}$ multiplied by 224,000, the product expressed in miles is 40 miles. Thus the distance to the *nearest* fixed star is 40 miles on the scale, which presents the sun at a distance of $11\frac{1}{2}$ inches.

The distances to only 12 of the fixed stars are known. The reason of this limitation could be readily given, but time does not permit.

SOLAR SYSTEM.

Next as to the solar system as is known to the eye, without the aid of the telescope.

It is presented in the instrument by the centre of the sun, and the centres of the planets of Mercury, Venus, Earth, Mars, Jupiter and Saturn in the simplicity in which they exist in space and by points as they are seen in the heavens. Each planet is presented in its true distance from the sun on the scale of the instrument, is movable in its plane as its known angle with the plane of the earth's orbit; the position in space of each plane is defined by the longitude of its line of intersection with the plane of the earth's orbit, marked on the plane in the instrument as its *line of nodes.*

To make known where the point that represents the centre of a planet is, there is placed over the point a small

ball indicating the place of the point. An elastic thread is stretched from the centre of the sun to the centre of the planet. This thread crosses the circle of degrees of longitude, thereby making known the longitude of the planet at that place in its orbit.

The motion in longitude each 24 hours of each planet is known.

Each planet can be placed at its known longitude on any given day, say 21st March, 1882. That being done and duly observed, each planet can be moved to the place it will be in at the end of any time, say 30 days. Multiply the sum in degrees of the motion of the planet in 24 hours by 30, the product will be the motion in degrees in 30 days; add that product to the degrees in longitude on 21st March, the sum is the position in longitude at the end of 30 days. Place the planet at that position in longitude.

In the same manner place each of the planets in its new position at the end of 30 days. Having carefully noted the relative positions of the 6 planets, carry forward each planet in a 30 days' movement to a new position; repeat this many times, and there will be a personal knowledge of the solar system that cannot be attained in any other way. Add to that, what time does not permit me to do, the designation of the several relations determined by position, and the knowledge is in a great degree complete.

CENTRE OF THE EARTH AND AXIS LINE OF ROTATION.

The next centre of reference used by the astronomer is the *centre of the earth*. The position of that centre and its motion, both in reference to the centre of the sun, has been defined and presented.

The plane of reference for lines from the centre of the

earth, is the plane of the equator, a plane in which are the line of the equator and the centre of the earth.

To that plane the axis line of rotation, called the axis of the earth, is at right angles.

That axis line passing through the centre of the earth is at the angle of 66½° with the plane of the earth's orbit, in which is the centre of the earth. As the centre of the earth moves in its orbit, the axis moves with it, but its successive positions are parallel positions, the line being continuously at an angle of 66½° with the plane of the earth's orbit. The relations thus described are presented by means of what is called the Pendulum Combination.

PENDULUM COMBINATION.

Time does not permit the description in detail of this combination. The pendulum which I hold in my hand has at its top the suspension tube, by which the pendulum is suspended at one end of the arm A from a rod, at right angles to the arm A. The pendulum weight carries a long tube-bearing, the centre line of which, when the pendulum is in place and free to hang in its vertical plane, is at an angle of 66½° with the plane of the earth's orbit, or at an angle of 23½° (90°–66½°) with its suspension rod, which rod is at right angles to the plane of the earth's orbit.

In this inclined tube-bearing I place a steel rod. That rod is then in the plane of the suspension-bearing and the centre of gravity of the pendulum weight, and is at an angle of 66½° with the plane of the earth's orbit. The centre line of the suspension-bearing extended intersects the rod in the inclined bearing in a point that is 11½ inches from the centre of the sun, and the line from that point to the centre of the sun is at right angles to the axis line of

revolution of the centre of the earth; the point therefore represents the centre of the earth. The position of the point is indicated by a circular cut on the rod.

I place on this circular cut the loop of an elastic thread, and stretching the thread I place the other loop on the circular cut, the point at the centre of which indicates the position of the centre of the sun in the instrument.

THE ALTERNATING ANGLES OF THE LINE FROM THE CENTRE OF THE SUN AND THE AXIS LINE OF THE EARTH.

I place the arm A in an horizontal position. I wish that every eye in this audience were near enough to apprehend clearly the remarkable presentation that follows. There would be seen a line from the centre of the sun to the centre of the earth, at *right angles* to the axis line of rotation, of necessity the place of the earth in its orbit when *night is equal to day.* This is therefore the place of the earth at the spring equinox. As I move the arm A downward, and the centre of the earth has its eastward motion, it will be seen that the angle 90°, the right angle, becomes less and less than 90°, until, at the end of a quarter revolution, the angle is $66\frac{1}{2}°$ ($90°-23\frac{1}{2}°$), the place of the summer solstice, occurring in June, continuing the revolution another quarter, the angle increases from $66\frac{1}{2}°$ to 90°; at the place of the fall equinox, occurring in September, continuing the revolution, the angle continues to increase to $113\frac{1}{2}°$ ($90°+23\frac{1}{2}''$); at the place of the winter solstice, occurring in December and completing the revolution by another quarter, the angle decreases to 90°, when the earth is again at the spring equinox.

PARALLEL POSITIONS OF THE AXIS LINE AS THE EARTH MOVES IN REVOLUTION.

It will be seen that at all the places of the revolution the axis line holds parallel positions.

The instrument is provided with the parts that show in detail that in these changes in angle of the angles made by a line to the centre of the earth in the axis line, from the centre of the sun are presented the causes of all the phenomena of light and heat, of the seasons, of the changes in length of day and night, etc., etc.

The time at my command makes necessary this statement out of its place.

If the instrument, being of the construction and adjusted to the position described, was in the open air, it would be seen that the axis line is always *in line* to the *North Star* at all places of the earth in its orbit, thus confirming the truth of the position of the instrument.

THE CENTRE OF THE EARTH ANOTHER CENTRE OF REFERENCE—THE PLACE OF THE PLANE OF THE EQUATOR, ITS PLANE OF REFERENCE, AND LINE PARALLEL TO LINE OF EQUINOX—ITS LINE OF REFERENCE.

The plane in which, as has been said, is the centre of the earth and the equatorial line is at right angles to the axis line.

I present that plane to the eye when I place a tube in the axis line rod, carrying a metal plate, on which is a thin sheet of paper, the plate holding the position at which the centre of the earth is in the sheet of paper. I place the arm A in a horizontal position, and then the line of equinox in the plane of the earth's orbit extended passes through the centre of the earth, and the line of equinox will be in

the plane of the equator, as well as in the plane of the earth's orbit.

As the axis line of the earth is at an angle of 23½°, with a line at right angles to the plane of the earth's orbit, and as the plane of the equator is at right angles to the axis line, therefore, the plane of the equator is at an angle of 23½° with the plane of the earth's orbit; as is, in fact, the relation of the two planes in space.

The plane of the equator has fixed connection with the pendulum, and, therefore, when the earth is moved in revolution the plane of the equator moves parallel to itself, and all the successive positions of the line of equinox in the plane of the equator are parallel positions.

HOURS OF RIGHT ASCENSION.

It will be seen that on the plane of the equator is a circle of figures, 1 to 24, at equal distances, the figures being counted from the line of equinox.

The numbers indicate hours of right ascension. The meaning of the name and the manner in which they are used to determine position will be explained presently. Their use will be described now.

Lines to objects in space from the centre of the earth are either in the plane of the equator or north or south of the plane.

If in the plane the line to the object will cross the hour circle at a certain hour and parts of an hour. Suppose the line crosses at 3 hours. Then it is said the right ascension of that object is 3 hours.

The line to another object crosses at 5½ hours. Then it is said that the right ascension of that object is 5½ hours.

ANGLES OF DECLINATION.

But if the line to the object is north or south of the plane of the equator, then it is at a certain angle with that plane. That angle is determined in the same manner as the angles of latitude already described, but a different name is given to it.

The angles made by lines from the centre of the earth to objects in space not in the plane of the equator, are called angles of declination, north or south, as the case may be, then the reference to the line of equinox is by the hours of right ascension.

To present an example of a line to a certain star, the declination north and the hour of right ascension being known, there is provided a rod which can be connected with the plane of the equator at hour 7½, and which carries a steel wire. The rod and the wire can be so adjusted in position higher or lower, that the wire points to the centre of the earth, and is at an angle of 39½° with its line of intersection. The steel wire then is the line to an object whose angle of declination north is 39½°, and hour of right ascension is 7½ hours. That object is the star Castor in the constellation of the twins (Gemini).

The line to the same star from the centre of the earth, is already presented in connection with the plane of the earth's orbit.

Observe these two lines are parallel. I move the arm A in revolution, it will be seen that at all places of the earth in its orbit the two lines continue parallel, and for the reason that in relation to the distance to the star Castor on the scale of the instrument exceeding 40 miles, we know not how much, the created change in position of the point

representing the earth (less than 2 feet) has no influence on the angles that can be observed by existing instruments.

It will be readily understood that the position of any star can be presented by its angle of declination and hour of right ascension, in the manner that has just been described.

LINES TO THE FIXED STARS FROM A PLACE OF OBSERVATION ON THE SURFACE OF THE EARTH IN THE PARALLEL OF 40° N.

Next is to be presented the line to a fixed star from a place of observation in a known parallel of latitude on the surface of the earth: the parallel taken is 40° N., very nearly the parallel of the city of New York.

The plane of reference of lines from a place of observation in the parallel of 40° N. is the plane tangent to the surface of the earth at the place of observation in the parallel of 40° N., and the line of reference is the line in that plane passing through the place of observation—that is, parallel to the line of equinox in the plane of the equator.

Now, this plane of observation, the plane tangent to the surface of the earth in the parallel of 40° N., is presented in the instrument, although the earth on the scale of the instrument is only $\frac{1}{1000}$ of an inch in diameter, which is shown as follows:

Divide 8,000, the diameter of the earth in miles, by 8,000,000 (the distance in miles represented by one inch on the scale of the instrument), the quotient $\frac{1}{1000}$ of an inch is the diameter of the earth in *the scale of the instrument.*

A place of observation in the parallel of 40° N. on a globe

$\frac{1}{1000}$ of an inch in diameter is at less than $\frac{1}{2000}$ of an inch from the centre of the globe.

Therefore the point presenting the centre of the earth, and a place of observation in the parallel of 40° N., cannot be distinguished by the eye from each other; and lines from a point representing the centre of the earth may be taken without error as representing lines from any point on its surface.

It is easily shown that the plane tangent to the surface of the earth in a certain parallel of latitude, when extended until it intersects the axis line of the earth, intersects the axis line at an angle the same as the angle of latitude of that parallel, and that this relation is constant for a certain latitude whatever be the diameter of the sphere taken to represent the earth. Therefore a plane intersecting the axis line at the centre of the earth at an angle of 40° with the axis line, may be taken to represent the plane tangent at the parallel of 40°, as the parallel planes through the two points are so nearly together that they cannot be seen separately.

I place in the inclined bearing in the pendulum an axis line rod, carrying at its top a metal plate. The point at the centre of the plate is 11½ inches from the centre of the sun, and a line from it to the centre of the sun, is at right angles to the axis line of revolution of the earth; that point, therefore, truly presents the centre of the earth in the axis line.

On the metal plate is a thin sheet of paper, that sheet of paper presents the *plane* of that metal plate; the centre of the earth is in that plane, and the plane is at an angle of 40° with the axis line, then that plane may be taken, and

is taken as presenting in the instrument the plane of observation in the parallel of 40°, and the plane is so marked.

The plane of observation being carried by the axis rod, and that rod having the motion of rotation of the earth, the plane of observation moves in rotation in common with the earth. Its position by motion is defined by the hours of rotation, determined by reference to the sun at midday.

To present these hours in the instrument, there is carried by the same axis line rod, an hour circle presenting the two sets of 12 hours each, hours P.M. and hours A.M. The hours are counted and marked from the midday line. The hour hand of the hour circle is carried by the plane of observation.

A plane at right angles to the plane of observation and that passes through *its centre* and through *the axis line of the earth* (presented in the instrument by the centre line of the axis line rod) is called the *meridian plane* of the place of observation. At the intersection of that plane with the plane of observation is the hour hand of the hour circle of hours of rotation.

The hour circle, A. M., P. M., has motion due to the motion of the centre of the earth *in revolution ;* the hour *hand* has motion due to the motion of the plane of observation in rotation, and, therefore, the hour circle needs at each place of the earth in its orbit to be adjusted to the midday line to indicate correct time of occurrences at each place of the earth in its orbit.

There is another hour circle, that has reference only to the rotation of the earth, which is determined in position by an observation of a star in reference to which the earth has no motion to the unaided eye except that due to rotation. For this hour circle the time of one rotation (a time

in which no change is or ever has been known) is divided into 24 hours.

HOURS OF RIGHT ASCENSION DETERMINED BY USE OF AN ASTRONOMICAL CLOCK.

The astronomer has knowledge of these hours by the use of an astronomical clock, carrying on its face 24 hours, regulated as nearly as may be to present 24 hours is one rotation, with the rate of loss or gain ascertained by infinite care, the correct time can be known by the clock.

It is by the use of this clock, and of an instrument known as the transit instrument, that the astronomer determines the relative positions of the stars as seen from the surface of the earth. The hours so noted are called hours of right ascension.

To refer to these hours in the instrument there is provided a circle of right ascension hours which count from the line of equinox. The hours are in position to be referred to, and the hour hand, carried by the plane of observation in the plane of the meridian of the place of observation, is also the hour hand of the hours of right ascension.

Having the plane of observation in place and movable in rotation, and moving in revolution when the centre of the earth is moved in revolution, and the hour circle of hours of right ascension in its fixed relation to the line of equinox, the instrument is adjusted to present the observations by which the relative position of the fixed stars from the place of observation is defined, the plane of observation, or the plane of the equator, being the plane of reference.

The instrument of observation is known as the transit instrument. This instrument is constructed, mounted and adjusted to observe angles *only* in the meridian plane of the instrument.

Its telescope can only be changed in position in a vertical plane.

Conceive the astronomer to be at the place of observation, prepared to make observations through the telescope of a transit instrument, having the astronomical clock at hand, but not in motion, the hands of the clock set at 0 hours 0 minutes 0 seconds, and that at the instant that the meridian plane of the transit instrument passes through the line of equinox the clock is put in motion and the astronomer begins his observation.

The movement of the earth in rotation carries the astronomer and his instrument eastward, and as each star is observed in the meridian plane and the centre line of the instrument is directed to the star, two observations are made: First, the culminating angle of the star; second, the time by the astronomical clock of that culmination.

The instrument is provided to show the culminating angle, the plane of observation being the plane of reference, and the culminating angle the plane of the equator being the plane of reference.

The astronomical clock gives the time of the culmination. The time is expressed in hours and parts of an hour.

Thus the relative position of the fixed stars is in part defined by *the time* in which the observer by instrument is carried from a known position to the position at which the star is seen in the meridian of the observer, and therefore, at its culminating angle, a time determined by a clock and called hours of right ascension. The expression used might be time distance.

The instrument is now ready for the study by the individual student of the solar and stellar system by observations, made by the use of the instrument.

THE SOLAR SYSTEM SEEN EDGEWISE FROM THE SURFACE OF THE EARTH.

One general fact is readily presented, viz: that the solar system is seen from the surface of the earth *edgewise*. This fact, in connection with the mistaken though confident belief that the earth, the place of observation, was an entirely motionless body, was the origin of the erroneous astronomical ideas that had possession of school and church for centuries before the time of Copernicus.

Take as an example the planet Venus, now known by the student as a planet moving continuously and at more nearly uniform rate than any other planet in one direction in a well-defined plane.

As looked for from the surface of the earth for many nights it is not seen at all, and when seen, only seen as an evening star or as a morning star, seen at times as stationary and at times moving in one direction, at times in another direction.

A few minutes observation of the movement of Venus in the instrument make all that is seen from earth, entirely consistent with the well-known motion of Venus through space.

As the instrument now stands it can be used to present to the eye whatever can be observed from the parallel of 40° N. in all places of the earth in its orbit, in relation to sun, planet or star.

The character of the observation will be presented by reference to the sun and to the planet Venus.

For this purpose I place the arm A. in an horizontal position, the earth in longitude 180°, and place the planet Venus at longitude 30°.

I adjust the hour circle by its midday line to the meri-

dian plane, when the meridian plane passes through the centre of the sun.

I draw the fine thread from the place of observation to the centre of the sun. The angle made by that line with the place of observation (50°) presents the angle at which light and heat are received by the surface of the earth at the place of observation in the parallel of 40° N.

I move the plane of observation slowly eastward, the angles of the sun's altitude, indicated by the angle of the line to the sun with the plane of observation, are seen to become less and less, and when the line to the sun coincides with the plane of observation, the occurrence of the *evening* sun takes place, and at the next movement of the plane in rotation, the sun is *shut out* of sight.

I note by reference to the P. M. hour circle that the time is 6 P. M.

I continue the motion in rotation of the plane of observation and soon its meridian plane passes through the centre of the sun, but the plane is turned away *from* the sun, and it is the occurrence of midnight.

I continue the motion of the plane in rotation eastward, and it comes to the position at which the line to the sun coincides with the plane of observation, and at the next movement of the plane in rotation the sun is disclosed to sight, and the occurrence of the *morning* sun takes place.

The time by the A. M. hour circle, it is 6 A. M. Thus it is observed that the hours of darkness are from 6 P. M. to 6 A. M.

Next I move in rotation the plane of observation to the position at which the meridian plane passes through Venus in longitude 30°.

By observations of the same character as those made in reference to the sun, are ascertained the hours at which

Venus is *first* and *last* in the line of sight. The hours are 6.30 A. M. and 7 P. M. and thus it is observed that at the place of the earth in its orbit, Venus is in the line of sight from 6.30 A. M. to 7 P. M. On comparing this time with the hours of darkness it is known that from 6.30 A. M. to 7 P. M. Venus is visible, and Venus is seen as an evening star.

After these determinations the earth and Venus may be considered to continue their motion in their orbit lines for the same number of days to new positions in longitude, the earth's motion being at .98° and Venus at 1.61° each day, or, for convenience of calculation, the earth at 1° and Venus at 1.6°, for any successive number of days, and at their new places in longitude, the observations are to be made that determine during what hours Venus is visible and when visible, whether seen as a morning or evening star.

THE TRANSIT OF VENUS IN 1882.

The recent phenomena of Venus seen moving over the surface of the sun is a well-timed example of what can be made plain in cause and calculation to a certain extent that is availed of as follows:

Once in each revolution of the earth the earth is in the longitude of 75°—more precisely, 74.1°—and once in each revolution of Venus Venus is in longitude of 75°, and is then *in the plane of the earth's orbit.* Once in very many years it occurs that the earth and Venus are at the longitude 75° so nearly at the same time that Venus is in line between the sun and certain points in the earth's surface, and therefore in this relative position Venus will be seen, by observers at certain points on the surface of the earth,

to pass over the surface of the sun, because the motion of Venus in its orbit is at 1.6°, while the earth moves at 1°.

The instrument can be used to present the essential character of the calculation by which the time of a transit of Venus is determined.

The following calculation is not decimally correct, nor does it include all necessary to define precisely the time, places, etc. In March, 1882, the earth being at longitude 180, Venus was at longitude °.

The earth's motion taken for convenience of calculation at 1° per day, and the motion of Venus taken at 1.6° per day, it is a simple algebraic problem to determine the time at which the earth and Venus will be in the same longitude. The answer is at 75°.

That this answer is correct is known as follows:

Earth's movement from 180° to 75° is 180 + 70 = 255; motion of Venus to motion of the earth 1.6° to 1°.

Therefore Venus moves 408° while the earth moves 255. To the longitude of Venus ° add 408° and Venus is at longitude 75°, at the same time the earth is at 75°, and thus at that longitude the transit occurs. The earth and Venus were in that relative position Dec. 6, 1882, when Venus was in line between the surface of the sun and certain places on the surface of the earth. As soon as in line it is seen as if on the surface of the sun, the sun is stationary.

COMPREHENSIVE STATEMENT OF THE CAPACITY OF THE INSTRUMENT.

I close these remarks explanatory with the comprehensive statement.

That the sun, planet and star instrument being in position and adjustment as described, the earth may be placed at *any* place in its orbit, and the hour circle being at its

midday point for that place of the earth, and the five planets and one selected star being at their places in longitude—these can be determined by observation by the use of the instrument.

1. The time by the hour circle A. M. P. M. at which the sun, each of the five planets and the selected star are first and last in the line of sight, and therefrom can be determined the hours of declination, and the hours during which each planet and the selected star, if visible at all, will be visible.

2. That if the earth be considered as having moved to a new place of longitude, each of the five planets can be moved to its place in longitude in the same line and the selected fixed star will remain in its place in longitude which it never leaves.

3. That at the new places in longitude the same facts can be determined.

4. That a succession of observations of this character is at the command of the student.

PRESENTATION NOT ON SCALE, BUT BY USE OF 5-INCH GLOBE CARRIED BY PENDULUM COMBINATION, AND OF LINE PARALLEL TO LINE FROM THE CENTRE OF THE SUN TO CENTRE OF THE EARTH, PRESENTING THE CAUSES OF ALL THE PHENOMENA OF LIGHT AND HEAT AS OBSERVED ON THE SURFACE OF THE EARTH.

In addition to the presentation on a scale of the great facts of astronomical knowledge, there is provided for use, in connection with the centre of the sun and the plane of the earth's orbit, a 5-inch terrestrial globe, carried by the pendulum combination, presenting the plane of observation in the parallel of 40° N., and there are provided the

parts that present a line parallel to the line from the centre of the sun to the centre of the earth, that can be adjusted to point to any place on the surface of the globe, whereby are presented the angles at which light and heat are received by the surface of the earth in any parallel, at different positions of the earth's rotation, and at different places of the earth in its orbit, among which are day and night, different length of day and night, different quantities of heat received by the same surface at different places of the earth in its orbit, and therewith the change of the seasons; and can be readily presented the fact, that by the movement of the earth in revolution round the sun, one rotation of the earth is lost when rotations are counted by reference to the sun.

All facts to be readily apprehended by an intelligent and attentive use of the eye.

MOON INSTRUMENT.

In connection with the sun, planet and star instrument, are instruments presenting on a scale, as to dimension as well as distance (except of the sun and distances to the sun), the moon in its relations to the earth, its motion round the earth in a line, the resultant of the two causes determining the moon's position in space.

The body of rays from the sun illuminating one-half of the surface of the earth, and the shadow of the earth as projected in space, which presents the causes of an eclipse of the sun, when the moon enters the body, or part of the body of illuminating rays; and the causes of an eclipse of the moon enters the shadow, or part of the shadow of the earth.

THE FIRST LANDING ON WRANGEL ISLAND,

WITH SOME

REMARKS ON THE NORTHERN INHABITANTS.

BY

IRVING C. ROSSE, M.D.

On May 4, 1881, through the courtesy of the Chief of Revenue Marine, Mr. E. W. Clark, I was allowed to take passage from San Francisco, Cal., on board the United States Revenue steamer *Corwin*, whose destination was Alaska and the northwest Arctic ocean. The object of the cruise was, in addition to revenue duty, to ascertain the fate of two missing whalers and, if possible, to communicate with the Arctic exploring yacht *Jeannette*.

Our well-found craft made good headway for seven or eight uneventful days of exceptionally fine weather, while the ocean, somewhat deserving the adjective that designates it, displayed its prettiest combinations of blue tints and sunset effects as we steamed through miles of medusidæ; and had it not been for the sight of occasional whales and the strange marine birds that characterize a higher latitude, we should scarcely have known of our approach to the north. Soon, however, we were beset by pelting hail and furious storms of snow and all the discomforts of sea life, causing a *pénible navigation* in every sense of the term. On May 15 we were somewhat disoriented while trying to make a landfall in a blinding snowstorm, and groped about for several hours before

anchoring under one of the Alp-like cliffs of the Aleutian islands.

* * * * * *

Without going into further details of the cruise, I will state that on the previous year five unsuccessful attempts were made by the *Corwin* to reach Herald island, and that Wrangel island was approached to within about twenty miles. This "problematical northern land," the existence of which the Russian Admiral Wrangel reported from accounts of Siberian natives, and which he tried unsuccessfully to find; a land that Captain Kellett, of Her Britannic Majesty's ship *Herald*, in 1849, thought he saw, but which, under more favorable circumstances of weather and position, was not seen by the United States ship *Vincennes;* a land, in fact, that from the foregoing statements and from the imperfect accounts of whalemen we had begun to regard as a myth, was actually seen; and I shall never forget the tinge of regret I felt when the necessity of the position obliged the withdrawal of the ship and I took a last lingering look at the ice-bound and unexplored coast, fully realizing at the time the joyous satisfaction that must animate the discoverer and explorer of an unknown land.

However, better luck was in store; for Captain Kellett's discovery was afterwards completed by the *Corwin.* I now purpose to narrate a few circumstances attending this first landing on Wrangel island, which may be best told by further reference to Herald island. Captain Kellett, the only person known to have landed at the latter place previously to this account, reports that the extent he had to walk over was not more than thirty feet, from which space he scrambled up a short distance; that with the time

he could spare and his materials "the island was perfectly inaccessible." He expresses great disappointment, as from its summit much could have been seen, and all doubts set aside regarding the land he supposed he saw to westward. An extract from one of Captain De Long's letters, making known his intention to retreat upon the Siberian settlements in the event of disaster to the *Jeannette*, says, in reference to a ship's being sent to obtain intelligence of him: "If the ship comes up merely for tidings of us let her look for them on the east side of Kellett land and on Herald island." Being in a measure guided by this information, the *Corwin* made the forementioned places objective points in the search. It was not, however, till after the coal bunkers were replenished with bituminous coal from a seam in the cliff above Cape Lisburne, that an effort was made to reach the island. During the run westward—a distance of 245 miles—the fine weather enabled us to witness some curious freaks of refraction and other odd phenomena for which the high latitudes are so remarkable. On July 30, the fine weather continuing, everybody was correspondingly elate and merry when both Herald and Wrangel islands were sighted from the "cro'-nest" and, as they were neared, apparently free from ice. This illusion, however, was soon dispelled. On approaching the land strong tide rips were encountered, and finally the ice, the drift of which was shown by the drop of a lead-line to be west-northwest. We steamed through about fifteen miles of this ice before being stopped, less than half a mile from the southeast end of the island by the fixed ice, to which the ship was secured with a kedge. We got off, and after considerable climbing and scrambling up and down immense hummocks, and jumping a number of crevices, finally set foot on the land

we had been so long trying to reach. Our advent created a great commotion among the myriads of birds that frequent the ledges and cliffs, and the intrusion caused them to whirl about in a motley cloud and scream at each other in ceaseless uproar. A few minutes sufficed to survey the situation, before attempting to ascend at a spot that seemed scarcely to afford footing for a goat. Near the foot of the cliffs were seen on the one hand several detached pinnacles of sombre-looking weather-worn granite that had withstood the vigor of many Arctic winters; on the other hand a seemingly inaccessible wall, vividly recalling the eastern face of the Rock of Gibraltar. This sight, strange and weird beyond description, did not fail to awaken odd thoughts and emotions, far removed as we were from all human intercourse, amid solitude and desolation, and for a moment the mind absorbed a dash of the local coloring. Selecting what was believed to be the most favorable spot to ascend the cliff, two of our party in making the attempt would occasionally detach large bowlders, which came bounding down like a bombardment.

The attempt was abandoned after climbing a few hundred feet. In company with several others, I tried what seemed to be a more practicable way—a gully filled with snow—up which we had gone scarcely a hundred feet when it, too, had to be abandoned. In the meantime the skin boat had been brought over the ice, and one of the men pointing out another place where he thought we might ascend, it was the work of but a few minutes to cross a bit of open water which led to the foot of a steep snowbank, somewhat discolored from the gravel brought down by melting snow. Without despairing, and being in that frame of mind prepared to incur danger to a reasonable extent for the sake of

knowledge, we climbed several hundred feet over the snow and ice, having to cut steps with an axe that we had brought along, before reaching the top. The latter stage of this proceeding was like scrambling over the dome of the Washington Capitol with a great yawning cliff below, and was well calculated to try the nerve of any one except a competent mountaineer or a sailor accustomed to a doddering mast. A ravine was next reached, through which tumbled with loud noise and wild confusion, over broken rocks and amid some scant lichens and mosses, a stream of pure water, which had hollowed out a shaft or funnel, forming a glacier mill or moulin. It was over the roof of this tunnel that we had passed, and it caused an awesome feeling to come over one to see the water leap down its mouth to an unseen depth with a loud rumbling noise. After a tiresome ascent of the ravine, this hitherto inaccessible island, like a standing challenge of Nature inviting the muscular and ambitious, was at last climbed to the very summit; and it may be remarked, with pardonable vanity, that the feat was never done before. The view revealed from the top of the island was a veritable apocalypse. There was something unique about the desolate grandeur of the novel surroundings that would cause a man of the Sir Charles Coldstream type to say there "is something in it," and the most hackneyed man of the world would acknowledge a new sensation. It was midnight, and the sun shone with gleaming splendor over all this waste of ice and sea and granite; on one hand Wrangel Island appeared in well-defined outline, on the other an open sea extended northward as far as we were able to make out by the aid of strong glasses. From our position about the middle of the island the two extreme points of Wrangel island bore southwest and west-by-south

respectively. In shape, Herald island is something like a boot with a depression at the instep, and at the westernmost extremity, near which it may be climbed with considerable ease, are found a number of jagged peaks and splintered pinnacles of granite, some of which resemble the giant remains of ancient sculpture, all the worse for exposure to the weather. On a promontory 1,400 feet high at the northeast point of the island I placed in a cairn a bottle containing written information of our landing and a copy of the New York *Herald* of April 23.*

Beyond the extraordinary bird life, no signs of life appeared, except a small fox, and a Polar bear. The latter put in an appearance just after we had returned on board at three o'clock in the morning, and the circumstances attending his slaughter, which were about as enlivening as shooting a sheep, put an end to this episode of our mission.

After great difficulty in getting out of the ice we ran all day on Sunday, July 31, along the edge of the pack with Wrangel Island in sight, but were unable to find a favorable lead that would take us nearer the land than twelve or fifteen miles. The principal events that go to make up the record of our cruise for the next ten days were the finding of a ship's lower yard; the fabulous numbers of eider ducks seen off the Siberian coast, and the usual encounters with fogs, bears, and ice.

On the morning of August 11, we were so near the unexplored land that we were most sanguine about getting ashore, although it seemed as if a journey would have first

* In November, 1882, while in London, I met Mr. Gilder, the *Herald* correspondent, who accompanied the U. S. ship *Rodgers*, and he showed me this record and paper which he had taken from the cairn during a subsequent visit to the island.

to be made over the ice. In the afternoon the chances were so good that I volunteered to go ashore on the ice on the morning of the 12th in company with Lieutenant Reynolds, Engineer Owen, and two men. Preparations were made accordingly; the skin boat, rations, etc., being got ready, and we spent a restless night in anticipating the events of the coming day. We were called at five o'clock on the morning of the 12th, and while eating a hurried breakfast the ship steamed inshore. We were fully prepared for the undertaking; but finding the leads in the ice more favorable than on the preceding evening, the little steamer jammed and crashed along in a labyrinthine course not without great difficulty, for at times she was completely beset by great masses of ice, which she steamed against at full speed for several minutes before they showed sign of giving way, and it seemed that all endeavors to get out of the pack would be futile. Happily, all these difficulties yielded, and a clear way being seen to a water hole just off the mouth of a river, we anchored in ten fathoms near some grounded floebergs, about a quarter of a mile off shore. A boat was then got away, and on the calm bright morning of August 12, 1881, the first landing on Wrangel Island was accomplished!

On the beach, composed of black slaty shingle, we found the skeleton of a whale from which the baleen was absent; also a quantity of driftwood, some of it twelve inches in diameter; a wooden wedge; a barrel-stave; a piece of a boat's spar and a fragment of a biscuit-box. The river, which we named *Clark river*, was about one hundred yards wide, two fathoms deep near the mouth, and rapid. From the top of a neighboring cliff, four hundred feet high, it could be seen trending back into the mountains some thirty or thirty-five miles. The moun-

tains, devoid of snow, were seen under favorable circumstances through a rift in the clouds, and appeared brown and naked, with smooth rounded tops. During a tramp of some miles over a muddy way, composed of argillaceous clay and black pebbles, I observed fragments of quartz and granite. Several specimens containing iron pyrites were also found. The cliffs in the vicinity of our landing are composed of slate, and the land over which I travelled seemed almost as barren as a macadamized road; but on searching closely several species of hyperborean plants were found, such as saxifrages, anemones, grasses, lichens aud mushrooms. The mosses and lichens were but feebly developed, and the phanerogamous plants were in the same state of severe repression. The following plants were collected; and I am indebted to Professor John Muir for their names:

Saxifraga flegellaris, Willd.
stellaris, L. var. *cornosa*, Poir.
sileneflora, Sternb.
hieracifolia, Waldst. & Kit.
rivularis, L. var. *hyperborea*, Hook.
bronchialis, L.
serpyllifolia, Pursh.
Anemone parviflora, Michx.
Papaver nudicaule, L.
Draba alpina, L.
Cochleria officinalis, L.
Artemisia borealis, Willd.
Nardosmia frigida, Hook.
Saussurea monticola, Richards.
Senecio frigidus, Less.
Potentilla nivea, L.
frigida, Vill. ?

Armeria macrocarpa, Pursh.
vulgaris, Willd.
Stellaria longipes, Goldie, var. *Edwardsii*, T. & G.
Cerastium alpinum, L.
Gymnandra Stelleri, Cham. & Schlecht.
Salix polaris, Wahl.
Luzulu hyperborea, R. Br.
Poa arctica, R. Br.
Aira cæspitosa, L. var. *Arctica*.
Alopecurus alpinus, Smith.

I made a collection of several spiders and of some larvæ. The spider, it appears, is an "undescribed species of *Erigone*," and the larvæ are probably lepidopterous. A small shrike was also secured as a specimen. We saw several species of gulls, a snowy owl—which by the way was very shy—a few lemmings, and the tracks of foxes and of bears.

Microscopic examination of mud obtained from the bottom, in the vicinity of our anchorage, revealed some shells of foraminifera. The density of the sea water, and the dip of the magnetic needle were ascertained here, as well as at other points in the Arctic; and as the observations are entirely new, I give the results in the accompanying tables. The water densities are from observations of Mr. F. E. Owen, Assistant Engineer of the *Corwin*.

The instruments used in obtaining the results were a thermometer and a hydrometer. Water was drawn at about six feet below the surface and heated to a temperature of 200° F., and the saturation or specific gravity is shown by the depth to which the hydrometer sank in the water. As sea water commonly contains one part of saline matter to thirty-two parts of water, the instrument is

marked in thirty-seconds, as $\frac{1}{32}$, $\frac{2}{32}$, etc., and the densities are fractional parts of one thirty-second:

POINTS OF OBSERVATION.	Temperature.	Density.
At Saint Michael's, Bering sea	50	$\frac{1}{4}$
Off Plover bay, Asia	34	$\frac{2}{4}$
Arctic ocean, near Bering straits	32	$\frac{3}{4}$
Arctic ocean, near ice on Siberian coast	32	$\frac{3}{4}$
Bering sea, off Saint Lawrence island	34	$\frac{2}{4}$
Golovine bay, Bering sea, July 10	42	$\frac{1}{4}$
Bering sea between King's island and Cape Prince of Wales, July 12	44	$\frac{3}{4}$
Entrance to Kotzebue sound, July 13	47	$\frac{3}{4}$
Cape Thompson, Arctic ocean, July 17	36	$\frac{3}{4}$
Icy cape, July 24	36	$\frac{3}{4}$
Herald island, in the ice, July 30	31	$\frac{3}{4}$
Cape Wankarem, Siberia, August 5	33	$\frac{3}{4}$
Wrangel island (surface, in ice), August 12	31	$\frac{1}{4}$
Wrangel island (below surface 6 feet), August 12	31	$\frac{3}{4}$

The following table, showing the dip of the magnetic needle, was prepared from observations made by Lieut. O. D. Myrick:

LOCALITY.	LATITUDE, North.		LONGITUDE, West.		DIP.	
	Deg.	Min.	Deg.	Min.	Deg.	Min.
ALASKA—						
Ounalaska	53	56	166	18	66	53.5
St. Michael's	63	27	161	37	75	00.6
Kotzebue sound	66	03	161	47	77	05.0
Cape Sabine	68	50	165	10	78	47 8
Icy cape	70	08	161	58	79	56.3
Point Barrow	71	23	156	15	81	18.6
ASIA—						
Plover bay	64	21	173	11	73	34.7
Cape Wankarem	67	48	175	11	77	09.7
Wrangel island	71	04	177	40	79	52.5

To commemorate our visit, a flag, placed on a pole of driftwood, was erected on a cliff, and to the staff was secured a wide-mouthed bottle and a tin cylinder, in which I enclosed information of our landing, etc. On raising the flag three cheers were given, and a salute was fired from the cutter in honor of our newly acquired territory.

These evidences of our short visit, which was soon afterward supplemented by the more extended exploration of the *Rodgers*, having now become matters of history, it may be remarked with pardonable pride that the acquisition of

this remote island, though of no political or commercial value, will serve the higher and nobler purpose of a perpetual reminder of American enterprise, courage and maritime skill.

General Remarks on the Northern Inhabitants.

From an anthropological point of view the Eskimo coming under observation proved most interesting. The term Eskimo may be held to include all the Innuit population living on the Aleutian islands, the islands of Bering sea, and the shores both of Asia and America north of about latitude 64°. In this latitude on the American coast the ethnical points that difference the North American from the Eskimo are distinctly marked. It cannot, however, be said that the designating marks of distinction are so plain between the American Eskimo and the so-called Tchuktschi of the Asiatic coast. I have been unable to see anything more in the way of distinction than exists between Englishmen and Danes, for instance, or between Norwegians and Swedes. Indeed, it may be said that much of the confusion and absurdity of classification found in ethnographic literature may be traced to a tendency to see diversities where few or none exist. To the observant man of travel who has given the matter any attention, it seems that the most sensible classification is that of the ancient writers who divide humanity into three races, namely, white, yellow, and black. Cuvier adopted this division, and the best contemporary British authority, Dr. Latham, also makes three groups, although he varies somewhat in details from Cuvier. In accordance with the nomenclature of Latham, the Eskimo may be spoken of as

Hyperborean Mongolidæ of essentially carnivorous and ichthyophagous habits, who have not yet emerged from the hunting and fishing stage.

PHYSICAL PECULARITIES.

Their physical appearance and structure having been already described by others, it is unnecessary to mention them here, except incidentally and by way of noting a few peculiarities that seem to have been heretofore overlooked or slightly touched upon by other writers. Although as a rule they are of short build, averaging about five feet seven inches, yet occasional exceptions were met with among the natives of Kotzebue sound, many of whom are tall and of commanding appearance. At Cape Kruzenstern a man was seen who measured six feet six inches in height. This divergence from the conventional Eskimo type, as usually described in the books, may have been caused by intermarriage with an inland tribe of larger men from the interior of Alaska, who come to the coast every summer for purposes of trade.

The complexion, rarely a true white, but rather that of a Chinaman, with a healthy blush suffusing each cheek, is often of a brownish-yellow and sometimes quite black, as I have seen in several instances at Tapkan, Siberia. Nor is the broad and flat face and small nose without exception. In the vicinity of East cape, the eastermost extremity of Asia, a few Eskimo were seen having distinctive Hebrew noses and a physiognomy of such a Jewish type as to excite the attention and comment of the sailors composing our crew; others were noticed having a Milesian cast of features and looked like Irishmen, while others resembled several old mulatto men I know in Washington. However, the

Mongoloid type in these people was so pronounced that our Japanese boys on meeting Eskimo for the first time took them for Chinamen; on the other hand the Japs were objects of great and constant curiosity to the Eskimo, who doubtless took them for compatriots, a fact not to be wondered at, since there is such a similarity in the shape of the eyes, the complexion, and hair. In regard to the latter it may be remarked that scarcely anything on board the *Corwin* excited greater wonder and merriment among the Eskimo than the presence of several persons whom Professor Huxley would classify in his Xanthocroic group because of their fiery red hair.

The structure and arrangement of the hair having lately been proposed as a race characteristic upon which to base an ethnical classification, I took pains to collect various specimens of Innuit hair, which, in conjunction with Dr. Kidder, U. S. N., I examined microscopically and compared with the hair of fair and blue-eyed persons, the hair of negroes, and as a matter of curiosity with the reindeer hair and the hair-like appendage found on the fringy extremity of the baleen plates in the mouth of a "bowhead" whale. Some microphotographs of these objects were made but with indifferent results.

To the man willing and anxious to make more extended research into the matter of race characteristics, I venture to say that a northern experience will afford him ample opportunity for supplementing Mr. Murray's paper on the Ethnological Classification of Vermin; and he may further observe that the Eskimo, whatever may be his religious belief or predilection, apparently observes the prohibitions of the Talmud in regard both to filth and getting rid of noxious entomological specimens that infest his body and habitation.

Whatever modification the bodily structure of the Eskimo may have undergone under the influence of physical and moral causes, when viewed in the light of transcendental anatomy, we find that the mode, plan, or model upon which his animal frame and organs are founded is substantially that of other varieties of men.

Some writers go so far, in speaking of the Eskimo's correspondence, mental and physical, to his surroundings as to mention the seal as his correlative, which, in my opinion, is about as sensible as speaking of the reciprocal relations of a Cincinnati man and a hog. Unlike the seal, which is preëminently an amphibian and a swimmer, the Eskimo has no physical capability of the latter kind, being unable to swim and having the greatest aversion to water except for purposes of navigation. He wins our admiration from the expert management at sea of his little shuttle-shaped canoe, which is a kind of marine bicycle, but I doubt very much the somersaults he is reported to be able to turn in them. In fact, after offering rewards of that all-powerful incentive, tobacco, on numerous occasions, I have been unsuccessful in getting any one of them to attempt the feat, and when told that we had heard of their doing it they smiled rather incredulously. The Eskimo are clearly not successes in a cubistic or saltatorial line, as I have had ample opportunities to observe. They seem to be unable to do the simplest gymnastics, and were filled with the greatest delight and astonishment at some exhibitions we gave them on several occasions. Receiving a challenge to run a foot-race with an Eskimo, I came off easy winner, although I was handicapped by being out of condition at the time; a challenge to throw stones also resulted in the same kind of victory; I shouldered and carried some logs of driftwood

that none of them could lift, and on another occasion the captain and I demonstrated the physical superiority of the Anglo-Saxon by throwing a walrus lance several lengths farther than any of the Eskimo who had provoked the competition. As a rule they are deficient in biceps, and have not the well-developed muscles of athletic white men. The best muscular development I saw was among the natives of Saint Lawrence island, who, by the way, showed me a spot in a village where they practiced athletic sports, one of these diversions being lifting and "putting" heavy stones, and I have frankly to acknowledge that a young Eskimo got the better of me in a competition of this kind. It is fair to assume that one reason for this physical superiority was the inexorable law of the survival of the fittest, the natives in question being the survivors of a recent prevailing epidemic and famine.

ESKIMO APPETITES.

As far as my experience goes the Eskimo have not the enormous appetites with which they are usually accredited. The Eskimo who accompanied Lieutenant May, of the Nares Expedition, on his sledge journey, is reported to have been a small eater, and the only case of scurvy, by the way; several Eskimo who were employed on board the *Corwin* as dog-drivers and interpreters were as a rule smaller eaters than our own men, and I have observed on numerous occasions among the Eskimo I have visited, that instead of being great gluttons, they are, on the contrary, moderate eaters. It is, perhaps, the revolting character of their food—rancid oil, a tray of hot seal entrails, a bowl of coagulated blood, for example—that causes overestimation of the quantity eaten. Persons in whom nausea and dis-

gust are awakened at tripe, putrid game, or moldy and maggotty cheese affected by so-called epicures, not to mention the bad oysters which George I. preferred to fresh ones, would doubtless be prejudiced and incorrect observers as to the quantity of food an Eskimo might consume. From some acquaintance with the subject I therefore venture to say that the popular notion regarding the great appetite of the Eskimo is one of the current fallacies. The reported cases were probably exceptional ones, happening in subjects who had been exercising and living on little else than frozen air for perhaps a week. Any vigorous man in the prime of life who has been shooting all day in the sharp, crisp air of the Arctic will be surprised at his gastronomic capabilities; and personal knowledge of some almost incredible instances amongst civilized men might be related, were it not for fear of being accused of transcending the bounds of veracity.

ORIGIN AND DEVELOPMENT.

There is so much about certain parts of Alaska to remind one of Scotland that we wonder why some of the more southern Eskimo have not the intrepidity and vigor of Scotchmen, since they live under almost the same topographical conditions amid fogs and misty hills. Perhaps if they were fed on oatmeal, and could be made to adopt a few of the Scotch manners and customs, religious and otherwise, they might, after infinite ages of evolution, develop some of the qualities of that excellent race. It is probably not so very many generations ago that our British progenitors were like these original and primitive men as we find them in the vicinity of Bering straits. Here the mind is taken back over centuries, and one is able to

study the link of transition between the primitive men of the two continents at the spot where their geograpical relations lead us to suspect it. Indeed, the primitive man may be seen just as he was thousands of years ago by visiting the village perched like the eyry of some wild bird about 200 feet up the side of the cliff at East cape, on the Asiatic side of the straits. This bold, rocky cliff, rising sheer from the sea to the height of 2,100 feet, consists of granite, with lava here and there, and the indications point to the overflow of a vast ice sheet from the north, evidences of which are seen in the trend of the ridges on the top, and the form of the narrow peninsula joining the cliff to the mainland. From the summit of the cape the Diomedes, Fairway Rock, and the American coast are so easily seen that the view once taken would dispel any doubts as to the possibility of the aboriginal denizens of America having crossed over from Asia, and it would require no such statement to corroborate the opinion as that of an officer of the Hudson Bay Company, then resident in Ungava bay, who relates that in 1839 an Eskimo family crossed to Labrador from the northern shore of Hudson's straits on a raft of driftwood. Natives cross and recross Bering straits to-day on the ice and in primitive skin canoes, not unlike Cape Cod dories, which have not been improved in construction since the days of prehistoric man. Indeed, the primitive man may be seen at East cape almost as he was thousands of years ago. Evolution and development, with the exception of firearms, seem to have halted at East cape. The place, with its cave-like dwellings and skin-clad inhabitants, among whom the presence of white men creates the same excitement as the advent of a circus among the colored population of Washington, makes one

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fancy that he is in some grand prehistoric museum, and that he has gone backward in time several thousand years in order to get there.

While we may do something towards tracing the effects of physical agents on the Eskimo back into the darkness that antedates history, yet his geographical origin and his antiquity are things concerning which we know but little. Being subjects of first-class interest, deserving of grave study and so vast in themselves, they cannot be touched upon here except incidentally. Attempting to study them is like following the labyrinthal ice mazes of the Arctic in quest of the North Pole.

We may, however, venture the assertion that the Eskimo is of autocthonic origin in Asia, but is not autocthonous in America. His arrival there and subsequent migrations are beyond the reach of history or tradition. Others, though, contend from the analogy of some of the western tribes of Brazil, who are identical in feature to the Chinese, that the Eskimo may have come from South America; and the fashion of wearing labrets, which is common to the indigenous population both of Chili and Alaska, has been cited as a further proof.

Touching the subject of early migrations, Mr. Charles Wolcott Brooks, whose sources of information at command have been exceptionally good, reports in a paper to the California Academy of Sciences a record of sixty Japanese junks which were blown off the coast and by the influence of the Kuro-Shiwo were drifted or stranded on the coast of North America, or on the Hawaiian or adjacent islands. As merchant ships and ships of war are known to have been built in Japan prior to the Christian era, a great number of disabled junks containing small parties of Japanese must

have been stranded on the Aleutian islands and on the Alaskan coast in past centuries, thereby furnishing evidence of a constant infusion of Japanese blood among the coast tribes.

Leaving aside any attempt to show the ethnical relations of these facts, the question naturally occurs whether any of these waifs ever found their way back from the American coast. On observing the course of the great circle of the Kuro-Shiwo and the course of the trade winds, one inclines to the belief that such a thing is not beyond the range of possibility. Indeed, several well-authenticated instances are mentioned by Mr. Brooks; and in connection with the subject he advances a further hypothesis, namely, the American origin of the Chinese race, and shows in a plausible way that—

> The ancestry of China may have embarked in large vessels as emigrants, perhaps from the vicinity of the Chincha Islands, or proceeded with a large fleet, like the early Chinese expedition against Japan, or that of Julius Cæsar against Britain, or the Welsh Prince Madog and his party, who sailed from Ireland and landed in America A. D. 1170; and, in like manner, in the dateless antecedure of history, crossed from the neighborhood of Peru to the country now known to us as China.

If America be the oldest continent, paleontologically speaking, as Agassiz tells us, there appears to be some reason for looking to it as the spot where early traces of the race are to be found, and the fact would seem to warrant further study and investigation in connection with the indigenous people of our continent, thereby awakening new sources of inquiry among ethnologists.

LINGUISTIC PECULIARITIES.

The sienite plummet from San Joaquin Valley, California, goes back to the distant age of the Drift; and the

Calaveras skull, admitting its authenticity, goes back to the Pliocene epoch, and is older than the relics or stone implements from the drift gravel and the European caves.

It is doubtful, though, whether these data enable us to make generalizations equal in value to those afforded by the study of vocabularies. It is alleged that linguistic affinities exist between some of the tribes of the American coast and our Oriental neighbors across the Pacific. Mr. Brooks, whom I have already quoted, reports that in March, 1860, he took an Indian boy on board the Japanese steam corvette *Kanrin-maru*, where a comparison of Coast-Indian and pure Japanese was made at his request by Funkuzawa Ukitchy, then Admiral's secretary; the result of which he prepared for the press and published with a view to suggesting further linguistic investigations. He says that quite an infusion of Japanese words is found among some of the Coast tribes of Oregon and California, either pure or clipped, along with some very peculiar Japanese "idioms, constructions, honorific, separative, and agglutinative particles"; that shipwrecked Japanese are invariably enabled to communicate understandingly with the Coast Indians, although speaking quite a different language, and that many shipwrecked Japanese have informed him that they were enabled to communicate with and understand the natives of Atka and Adakh islands of the Aleutian group.

With a view to finding out whether any linguistic affinity existed between Japanese and the Eskimo dialects in the vicinity of Bering straits, I caused several Japanese boys, employed as servants on board the *Corwin*, to talk on numerous occasions to the natives both of the American and Asiatic coasts; but in every instance they were unable

to understand the Eskimo, and assured me that they could not detect a single word that bore any resemblance to words in their own language.

The study of the linguistic peculiarities which distinguish the population around Bering straits offers an untrodden path in a new field; but it is doubtful whether the results, except to linguists like Cardinal Mezzofanti, or philologists of the Max Müller type, would be at all commensurate with the efforts expended in this direction, since it is asserted that the human voice is incapable of articulating more than twenty distinct sounds, therefore whatever resemblances there may be in the particular words of different languages are of no ethnic value. Although these may be the views of many persons not only in regard to the Eskimo tongue but in regard to philology in general, the matter has a wonderful fascination for more speculative minds.

Much has been said about the affinity of language among the Eskimo—some asserting that it is such as to allow mutual intercourse everywhere—but instances warrant us in concluding that considerable deviations exist in their vocabularies, if not in the grammatical construction. For instance, take two words that one hears oftener than any others: On the Alaska coast they say "na-koo-ruk," a word meaning "good," "all right," etc.; on the Siberian coast "mah-zink-ah," while a vocabulary collected during Lieutenant Schwatka's expedition gives the word "mah-muk'-poo" for "good." The first two of these words are so characteristic of the tribes on the respective shores above the strafts that a better designation than any yet given to them by writers on the subject would be *Nakoorooks* for the people on the American side and *Mazinkahs* for those

on the Siberian coast. These names, by which they know each other, are in general use among the whalemen and were adopted by every one on board the *Corwin*.

Again, on the American coast "Am-a-luk-tuk" signifies plenty, while on the Siberian coast it is "Num-kuck-ee." "Tee-tee-tah" means needles in Siberia, in Alaska it is "mitkin." In the latter place when asking for tobacco they say "te-ba-muk," while the Asiatics say "salopa." That a number of dialects exists around Bering straits is apparent to the most superficial observer. The difference in the language becomes apparent after leaving Norton sound. The interpreter we took from Saint Michael's could only with difficulty understand the natives at Point Barrow, while at Saint Lawrence island and on the Asiatic side he could understand nothing at all. At East cape we saw natives who, though apparently alike, did not understand each other's language. I saw the same thing at Cape Prince of Wales, the western extremity of the New World, whither a number of Eskimo from the Wankarem river, Siberia, had come to trade. Doubtless there is a community of origin in the Eskimo tongue, and these verbal divergencies may be owing to the want of written records to give fixity to the language, since languages resemble living organisms by being in a state of continual change. Be that as it may, we know that this people has imported a number of words from coming in contact with another language, just as the French have incorporated into their speech "le steppeur," "l'outsider," "le high life," "le steeple chase," "le jockey club," etc.—words that have no correlatives in French—so the Eskimo has appropriated from the whalers words which, as verbal expressions of his ideation, are undoubtedly better than anything in his own

tongue. One of these is "by and by," which he uses with the same frequency that a Spaniard does his favorite *mañana por la mañano.* In this instance the words express the state of development and habits of thought—one the lazy improvidence of the Eskimo, and the other the "to-morrow" of the Spaniard, who has indulged that propensity so far that his nation has become one of yesterday.

The change of the Eskimo language brought about by its coming in contact with another forms an important element in its history, and has been mentioned by the older writers, also by Gilder, who reports a change in the language of the Iwillik Eskimo to have taken place since the advent among them of the white men. Among other peculiarities of their phraseology occurs the word "tanuk," signifying whiskey, and it is said to have originated with an old Eskimo employed by Moore as a guide and dog-driver when he wintered in Plover bay. Every day about noon that personage was in the habit of taking his appetizer and usually said to the Eskimo, "Come, Joe, let's take our tonic." Like most of his countrymen, Joe was not slow to learn the meaning of the word, and to this day the firm hold "tanuk" has on the language is only equalled by the thirst for the fluid which the name implies. Among the Asiatic Eskimo the word "um-muck" is common for "rum," while "em-mik" means water. Even words brought by whalers from the South Sea islands have obtained a footing, such as "kow-kow" for food, a word in general use, and "pow" for "no," or "not any." They also call their babies "pick-a-nee-nee," which to many persons will suggest the Spanish word or the Southern negro idiom for "baby." The phrase "pick-a-nee-nee kowkow" is the usual formula in begging

food for their children. An Eskimo, having sold us a reindeer, said it would be "mazinkah kow-kow" (good eating), and one windy day we were hauling the seine, and an Eskimo seeing its empty condition when pulled on to the beach, said, "'Pow' fish; bimeby 'pow' wind, plenty fish."

The fluency with which some of these fellows speak a mixture of pigeon English and whaleman's jargon is quite astonishing, and suggests the query whether their fluency results from the aggressiveness of the English or is it an evidence of their aptitude? It seems wonderful how a people we are accustomed to look upon as ignorant, benighted and undeveloped, can learn to talk English with a certain degree of fluency and intelligibility from the short intercourse held once a year with a few passing ships. How many "hoodlums" in San Francisco, for instance, learn anything of Norwegian or German from frequenting the wharves? How many "wharf rats" or stevedores in New York learn anything of these languages from similar intercourse? Or, for that matter, we may ask, How many New York pilots have acquired even the smallest modicum of French from boarding the steamers of the Compagnie Générale Transatlantique?

From a few examples it will be seen that the usage followed by the Eskimo in its grammatical variations rests on the fixity of the radical syllable and upon the agglomeration of the different particles intended to modify the primitive sense of this root, that is to say upon the principle of agglutinative languages. One or two instances may suffice to show the agglutinate character of the language. Canoe is "o-me-uk;" ship "o-me-uk-puk;" steamer "o-me-uk-puk-ignelik;" and this composite mechanical structure

reaches its climax in steam-launch, which they call "o-me-uk-puk-ignelik-pick-a-nee-nee."

For snow and ice in their various forms there are also many words which show further the polysynthetic structure of the language—a fact contrary to that primitive condition of speech where there are no inflections to indicate the relations of the words to each other. It will not do to omit "O-kee-chuck" from this enumeration—a word signifying trade, barter, or sale, and one most commonly heard among these people. When they wish to say a thing is bad they use "A-shu-ruk," and when disapproval is meant they say "pe-chuk." The latter word also expresses general negation. For instance, on looking into several unoccupied houses a native informs us "Innuit pechuk," meaning that the people are away or not at home; "Allopar" is cold, and "allopar pechuk" is hot. Persons fond of tracing resemblances may find in "Ignik" (fire) a similarity to the Latin *ignis* or the English "ignite," and from "Un-gi doo-ruk" (big, huge) the transition down to "hunky-dory" is easy. Those who see a sort of complemental relation to each other of linguistic affinity and the conformity in physical characters may infer from "Mikey-doo-rook" (a term of endearment equivalent to "Mavourneen" and used in addressing little children) that the inhabitants within the Polar Circle have something of the Emerald Isle about them. But no, they are not Irish, for when they are about to leave the ship or any other place for their houses they say "to hum"; consequently they are Yankees.

I do not wish to be thought frivolous in my notions regarding the noble science of philology; but when one considers the changes that language is constantly undergoing, the inability of the human voice to articulate more than

twenty distinct sounds, and the wonderful amount of ingenious learning that has been wasted by philologists on trifling subjects, one is disposed to associate many of their deductions with the savage picture-writing on Dighton Rock, the Cardiff Giant, and the old wind-mill at Newport.

ESKIMO DIETETICS.

Attempts to trace or discover the origin of races through supposed philological analogies do not possess the advantage of certainty afforded by the study of the means by which individuals of the race supply the continuous demands of the body with the nutriment necessary to maintain life and health.

Everybody has heard of the seal, bear, walrus, and whale in connection with Eskimo dietetics, and doubtless the stomachs of most persons would revolt at the idea of eating these animals, the taste for which, by the way, is merely a matter of early education or individual preference; for there is no good reason why they should not be just as palatable to the northern appetite as pig, sheep, and beef are to the inhabitants of temperate latitudes. As food they renew the nitrogenous tissues, reconstruct the parts and restore the functions of the Eskimo frame, prolong his existence, and produce the same animal contentment and joy as the more civilized viands of the white man's table. There are more palatable things than bear or eider duck, yet I know many persons to whom snails, olive oil, and *paté de fois gras* are more repugnant. A tray full of hot seal entrails, a bowl of coagulated blood, and putrid fish are not very inviting or lickerish to ordinary mortals, yet they have their analogue in the dish of some farmers who eat a preparation of pig's bowels known as "chitterlings,"

and in the blood-puddings and Limburger cheese of the Germans. Blubber-oil and whale are not very dainty dishes, yet consider how many families subsist on half-baked saleratus biscuits, salted pork, and oleomargarine.

On the mess table of the Fur Company's establishment at St. Paul island, seal meat is a daily article of consumption, and from personal experience I can testify as to its palatability, although it reminded one of indifferent beef rather overdone. Hair seal and bear steaks were on different occasions tried at the mess on board the Corwin, but everybody voted eider duck and reindeer the preference. It is not so very long since that whale was a favorite article of diet in England and Holland, and Arctic whalemen still, to my personal knowledge, use the freshly tried oil in cooking; for instance in frying cakes, for which they say it answers the purpose as well as the finest lard, while others breakfast on whale and potatoes prepared after the manner of codfish balls. The whale I have tasted is rather insipid eating, yet it appears to be highly nutritious, judging from the well-nourished look of natives who have lived on it, and the air of greasy abundance and happy contentment that pervades an Eskimo village just after the capture of a whale. Being ashore one day with our pilot, we met a native woman whom he recognized as a former acquaintance, and on remarking to her that she had picked up in flesh since he last saw her, she replied that she had been living on a whale all the Winter, which explained her plumpness.

It must not be supposed, however, that the whale, seal and walrus constitute the entire food supply of the Arctic. There is scarcely any more toothsome delicacy than reindeer, the tongue of which is very dainty and succulent.

There is one peculiarity about its flesh—in order to have it in perfection it must be eaten very soon after being killed; the sooner the better, for it deteriorates in flavor the longer it is kept. Indeed, the Eskimo do not wait for the animal heat to leave the carcass, as they eat the brains and paunch hot and smoking.

While our gastronomic enthusiasm did not extend this far, we dined occasionally on fresh trout from a Siberian mountain lake, young wild ducks as fat as squabs, and reindeer, any of which delicacies could not be had in the same perfection at Delmonico's or any similar establishment in New York for love or money. There is scarcely any better eating in the way of fish than *coregonus*—a new species discovered at Point Barrow by the *Corwin*—and certainly no more dainty game exists than the young wild geese and ptarmigan to be found in countless numbers in Hotham inlet. At the latter place, doubtless the warmest inside the straits, are found quantities of cranberries about the size of a pea, which not only make a delicious accessory to roasted goose, but act as a valuable antiscorbutic. These berries and a kind of kelp, which I have seen Eskimo eating at Tapkan, Siberia, seem to be the only vegetable food they have. The large quantities of eggs easily procurable, but in most cases doubtful, also constitute a standard article of diet among these people, who have no scruples about eating them partly hatched. They seemed never to comprehend our fastidiousness in the matter and why our tastes differed so much from theirs in this respect. They will break an egg containing an embryonic duck or goose, extract the bird by one leg and devour it with all the relish of an epicure. Gull's eggs, however, are in disrepute among them, for the women—who, by the way,

have the same frailties and weaknesses as their more civilized sisters—believe that eating gull's eggs causes loss of beauty and brings on early decrepitude. The men, on the other hand, are fond of seal eyes, a tid-bit which the women believe increases their amorousness, and feed to their lords after the manner of "Open your mouth and shut your eyes."

Game is, as a rule, very tame, and during the moulting season, when the geese are unable to fly, it is quite possible to kill them with a stick. At one place, Cape Thompson, Eskimo were seen catching birds from a high cliff with a kind of scoop-net, and I saw birds at Herald island refuse to move when pelted with stones, so unaccustomed were they to the presence of man. In addition to being very tame, game is plentiful, and it is not uncommon, off the Siberian coast, to see flocks of eider ducks darkening the air and occupying several hours in passing overhead. It was novel sport to see the natives throw a projectile known as an "apluketat" into one of these flocks with astonishing range and accuracy, bringing down the game with the effectiveness of a shotgun.

Game keeps so well in the Arctic that an instance is known of its being perfectly sweet and sound on an English ship after two years' keeping, and whalemen kill a number of pigs, which they hang in the rigging and keep for use during the cruise. It is also noticeable that leather articles do not mildew as they generally do at sea, some shoes kept in a locker on board the *Corwin* having retained their polish during the entire cruise.

The food of the Eskimo satisfies their instinctive craving for a hydrocarbon, but they do not allow themselves to be much disturbed or distracted in its preparation, as most of

it is eaten raw. They occasionally boil their food, however, and some of them have learned the use of flour and molasses, of which they are very fond.

Their aversion to salt is a very marked peculiarity, and they will not eat either corned beef or pork on this account. It may be that physiological reasons exist for this dislike.

SOCIAL AND DOMESTIC RELATIONS.

Omitting other ethnographic facts relative to the Eskimo, which might be treated in a systematic way except for their triteness, we pass from the means of the renewal of the animal economy to its reproduction. Courtship and marriage, which, it is said, are conducted in the most unsentimental manner possible, are for that reason not to be discussed; and for obvious reasons many of the prenatal conditions cannot here be dwelt upon. Having never witnessed the act of parturition in an Eskimo my knowledge of the subject is merely second-hand, and consequently not worth detailing. It appears, though, that parturition is a function easily performed among them, and that it is unattended by the post-partum accidents common to civilization. As a rule the women are unprolific, it being uncommon to find a family numbering over three children, and the mortality among the new-born is excessive, owing to the ignorance and neglect of the ordinary rules of hygiene. They seem, however, to be kind to their children, who in respect to crying do not show the same peevishness as seen in our nurseries; indeed, the social and demonstrative good nature of the race seems to crop out even in babyhood, as I have often witnessed under such circumstances as a baby enveloped in furs in a skin canoe which lay along side the ship during a snowstorm; its tiny hands protruding held

a piece of blubber, which it sucked with apparent relish, the unique picture of happy contentment. It was quick to feel itself an object of attraction, and its chubby face returned any number of smiles of recognition.

The manner of carrying the infant is contrary to that of civilized custom. It is borne on the back under the clothes of the mother, which form a pouch, and from which its tiny head is generally visible over one or the other shoulder, but on being observed by strangers it shrinks like a snail or a marsupian into its snug retreat. When the mother wants to remove it she bends forward, at the same time passing her left hand up the back under her garments, and seizing the child by the feet, pulls it downward to the left; then, passing the right hand under the front of the dress, she again seizes the feet and extracts it by a kind of podalic delivery. Another common way of carrying children is astride the neck. The subject is one that the Chucki artist often carves in ivory.

The play-impulse manifests itself among these people in various ways. They have such mimetic objects as dolls, miniature boats, etc. I have seen a group of boys, sailing toy boats in a pond, behave under the circumstances just as a similar group has been observed to do at Provincetown, Cape Cod, and the same act, as performed in the Frog Pond of the Boston Common, may be called only a differentiated form of the same tendency. Their dolls, of ivory and clothed with fur, seem to answer the same purpose that they do in civilized communities—namely, the amusement of little girls—for at one place where we landed a number of Eskimo girls, stopping play on our approach, sat their dolls up in a row, evidently with a view to giving the dolls a better look at the strange visitors. Spinning

tops, essentially Eskimo and unique in their character, are held in the hand while spinning; on the Siberian coast foot-ball is played, and among other questionable things acquired from contact with the whalemen, a knowledge of card-playing exists. We were very often asked for cards, and at one place where we stopped and bartered a number of small articles with the natives they gave evidence of their aptitude at gaming. The game being started, with the bartered articles as stakes, one fellow soon scooped in everything, leaving the others to go off dead-broke, amid the ridicule of some of our crew, and doubtless feeling worse than dead, for among no people that I have seen, not even the French, does ridicule so effectually kill.

PERSONAL ORNAMENTATION.

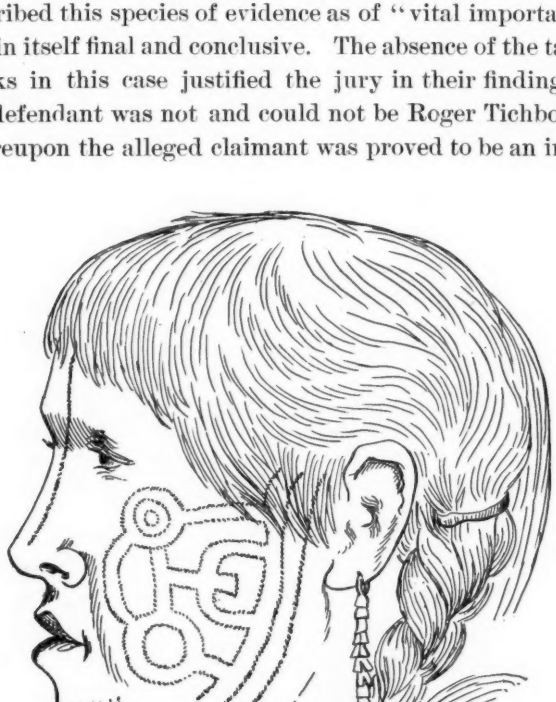
Among the means taken by these people to produce personal ornamentation that of tattooing the face and wearing a labret is the most noticeable. The custom of tattooing having existed from the earliest historical epochs is important, not only from an ethnological but from a medical and pathological point of view, and even in its relation to medical jurisprudence in cases of contested personal identity.

Without going into the history of the subject, it may not be irrelevant to mention that tattooing was condemned by the Fathers of the Church, Tertullian, among others, who gives the following rather singular reason for interdicting its use among women: "Certi sumus Spiritum Sanctum magis masculis tale aliquid subscribere potuisse si feminis subscripsisset." *

In addition to much that has been written by French and

* De Virginibus velandis. Lutetiæ Parisiorum, 1675 f°., p. 178.

German writers, the matter of tattoo-marks has of late claimed the attention of the law courts of England, the Chief-Justice, Cockburn, in the Tichbourne case, having described this species of evidence as of "vital importance," and in itself final and conclusive. The absence of the tattoo-marks in this case justified the jury in their finding that the defendant was not and could not be Roger Tichbourne, whereupon the alleged claimant was proved to be an impos-



Style of personal ornamentation adopted by the women of Saint Lawrence island.

tor, found guilty of perjury, and sentenced to penal servitude.*

Why the ancient habit of tattooing should prevail so extensively among some of the primitive tribes as it does, for instance, in the Polynesian islands and some parts of Japan, and we may say as a survival of a superstitious practice of paganism among sailors and others, is a psychological problem difficult to solve. Whether it be owing to perversion of the sexual instinct, which is not unlikely, or to other cause, it is not proposed to discuss. Be that as it may, the prevalence of the habit among the Eskimo is confined to the female sex, who are tattooed on arriving at the age of puberty. The women of Saint Lawrence island, in addition to lines on the nose, forehead and chin, have uniformly a figure of strange design on the cheeks, which is suggestive of cabalistic import. It could not be ascertained, however, whether such is the case. The lines drawn on the chin were exactly like the ones I have seen on Moorish women in Morocco. Another outlandish attempt at adornment was witnessed at Cape Blossom in a woman who wore a bunch of colored beads suspended from the septum of her nose. These habits, however, hardly seem so revolting as the use of the labret by the "Mazinka" men on the American coast, of whom it is related that a sailor seeing one of them for the first time, and observing the slit in the lower lip through which the native thrust his tongue, thought he had discovered a man with two mouths. The use of the labret, like many of the attempts at primitive ornamentation, is very old, its use having been traced by Dall along the American coast from the lower part of Chili

*See Guy's Hospital Report, XIX, 1874; also "Histoire Médicale du Tatouage," in Archives de Médecine Navale, Tom. 11 and 12, Paris, 1869.

to Alaska. Persons fond of tracing vestiges of savage ornamentation amid intellectual advancement and æsthetic sensibility far in advance of the primitive man, may observe in the wearers of bangles and earrings the same tendency existing in a differentiated form.

DIVERSIONS.

I doubt whether Shakespeare's dictum in regard to music holds good when applied to the Eskimo, for they have but little music in their souls, and among no people is there such a noticeable absence of "treason, stratagem and spoil." A rude drum and a monotonous chant, consisting only of the fundamental note and minor third, are the only things in the way of music among the more remote settlements of which I have any knowledge. Mrs. Micawber's singing has been described as the table-beer of acoustics. Eskimo singing is something more. The beer has become flat by the addition of ice. One of our engineers, who is quite a fiddler, experimented on his instrument with a view to seeing what effect music would have on the "savage breast," but his best efforts at rendering "Madame Angot" and the "Grande Duchesse" were wasted before an unsympathetic audience, who showed as little appreciation of his performance as some people do when listening to Wagner's "Music of the Future."

Where they have come in contact with civilization their musical taste is more developed. At Saint Michael's I was told that some of their songs are so characteristic that it is much to be regretted that some of them cannot be bottled up in a phonograph and sent to a musical composer. On the coast of Siberia I heard an Eskimo boy sing correctly a song he had learned while on board a whaling vessel, and

on several of the Aleutian islands the natives play the accordeon quite well; have music-boxes, and even whistle strains from "Pinafore."

From music to dancing the transition is obvious, no matter whether the latter be regarded in a Darwinian sense as a device to attract the opposite sex or as the expression of joyous excitement. This manifestation of feeling in its bodily discharge, which Moses and Miriam and David indulged in, which is ranked with poetry by Aristotle, and which old Homer says is the sweetest and most perfect of human enjoyments, is a pastime much in vogue among the Eskimo, and it required but little provocation to start a dance at any time on the *Corwin's* decks when a party happened to be on board. The dancing, however, had not the cadence of "a wave of the sea," nor was there the harmony of double rotation circling in a series of graceful curves to strains like those of Strauss or Gungl. On the contrary, there was something saltatorial and jerky about all the dancing I saw both among the men and women. It is the custom at some of their gatherings, after the hunting season is over, for the men to indulge in a kind of terpsichorean performance, at the same time relating in Homeric style the heroic deeds they have done. At other times the women do all the dancing. Being stripped to the waist they are more *décolleté* than our beauties at the German, and the men take the part of spectators only in this choregraphical performance.

ART INSTINCT.

The aptitude shown by Eskimo in carving and drawing has been noticed by all travellers among them. Some I have met with show a degree of intelligence and appreciation in regard to charts and pictures scarcely to be expected from such a source. From walrus ivory they sculpture

figures of birds, quadrupeds, marine animals, and even the human form, which display considerable individuality notwithstanding their crude delineation and imperfect detail. I have also seen a fair carving of a whale in plumbago. Evidences of decoration are sometimes seen on their canoes, on which are found rude pictures of walruses, etc., and they have a kind of picture-writing, by means of which they commemorate certain events in their lives, just as Sitting Bull has done in an autobiography that may be seen at the Army Medical Museum.

When we were searching for the missing whalers off the Siberian coast, some natives were come across with whom we were unable to communicate except by signs, and wishing to let them know the object of our visit, a ship was drawn in a note-book and shown to them, with accompanying gesticulations, which they quickly comprehended, and one fellow, taking the pencil and note-book, drew correctly a pair of reindeer horns on the ship's jib-boom—a fact which identified, beyond doubt, the derelict vessel they had seen. At Point Hope an Eskimo, who had allowed us to take sketches of him, desired to sketch one of the party, and taking one of our note-books and a pencil, neither of which he ever had in his hand before, produced the accompanying likeness of Professor Muir:

At Saint Michael's there is an Eskimo boy who draws remarkably well, having taught himself by copying from the *Illustrated London News*. He made a correct pen-and-ink drawing of the *Corwin*, and another of the group of buildings at Saint Michael's, which, though creditable in many respects, had the defect of many Chinese pictures, being faulty in perspective. As these drawings equal those in Dr. Rink's book, done by Greenland artists, I regret my inability to reproduce them here. As evidences of culture they show more advancement than the carvings of English rustics that a clergyman has caused to be placed on exhibition at the Kensington Museum.

Sir John Ross speaks highly of his interpreter as an artist; Beechy says that the knowledge of the coast obtained by him from Innuit maps was of the greatest value, while Hall and others show their geographical knowledge to be as perfect as that possible of attainment by civilized men unaided by instruments. I had frequent opportunities to observe these Eskimo ideas of chartography. They not only understood reading a chart of the coast when showed to them, but would make tracings of the unexplored part, as I knew a native to do in the case of an Alaskan river, the mouth only of which was laid down on our chart.

Manifestation of the plastic art, which is found among tribes less intelligent, is rare among the Eskimo. In fact, the only thing of the kind seen was some rude pottery at Saint Lawrence island, the design of which showed but crude development of ornamental ideas. The same state of advancement was shown in some drinking cups carved from mammoth ivory and a dipper made from the horn of a mountain sheep.

COMBATIVENESS.

In one of the acts of Shakespeare's "Seven Ages" the Eskimo plays a very unimportant *rôle*. Perhaps in no other race is the combative instinct less predominant; in none is quarrelling, fierceness of disposition, and jealousy more conspicuously absent, and in none does the desire for the factitious renown of war exist in a more rudimentary and undeveloped state. Perhaps the constant fight with cold and hunger is a compensation which must account for the absence of such unmitigated evils as war, taxes, complex social organization and hierarchy among the curious people of the icy north. The pursuits of peace and of simple patriarchal lives, notwithstanding the fact of much in connection therewith that is wretched and forbidding to a civilized man, seem to beget in these people a degree of domestic tranquility and contentment which, united to their light-hearted and cheery disposition, is an additional reason for believing the sum of human happiness to be constant throughout the world.

MENTAL CHARACTER AND CAPACITY.

The intellectual character of the Eskimo, judging from the information which various travellers have furnished, as well as my personal knowledge, produces more than a feeble belief in the possibility of their being equal to anything they choose to take an interest in learning. The Eskimo is not "muffled imbecility," as some one has called him, nor is he dull and slow of understanding, as Vitruvius describes the northern nation to be "from breathing a thick air"—which, by the way, is thin, elastic and highly ozonized—nor is he, according to Dr. Beke, "degenerated almost to the lowest state compatible with the retention of

rational endowments." On the contrary, the old Greenland missionary, Hans Egede, writes: "I have found some of them witty enough and of good capacity;" Sir Martin Frobisher says they are "in nature very subtle and sharp-witted;" Sir Edward Parry, while extolling their honesty and good nature, adds, "Indeed, it required no long acquaintance to convince us that art and education might easily have made them equal or superior to ourselves;" Sauer tells of a woman who learned to speak Russian fluently in rather less than twelve months, and Beechy and others have acknowledged the intelligent help they have received from Eskimo in making their explorations.

Before going further, it may not be amiss to speak in a general way of the bony covering which protects the organ whose function it is to generate the vibrations known as thought. Of one hundred crania, collected principally at Saint Lawrence island, a number were examined by me at the Army Medical Museum, through the courtesy of Dr. Huntington, with the result of changing and greatly modifying some of the previous notions of the conventional Eskimo skull as acquired from books on craniology. Perhaps after the inspection and examination of a large collection of crania, it may be safe to pronounce upon their differential character; but whether the differences in configuration are constant or only occasional manifestations, admits of as much doubt as the exceptions in Professor Sophocles's Greek grammar, which are often coextensive with the rule.*

The typical Eskimo skull, according to popular notion, is one exhibiting a low order of intelligence, and characterized by small brain capacity, with great prominence of the

*Retzius, Finska Kranier, Stockholm: 1878.

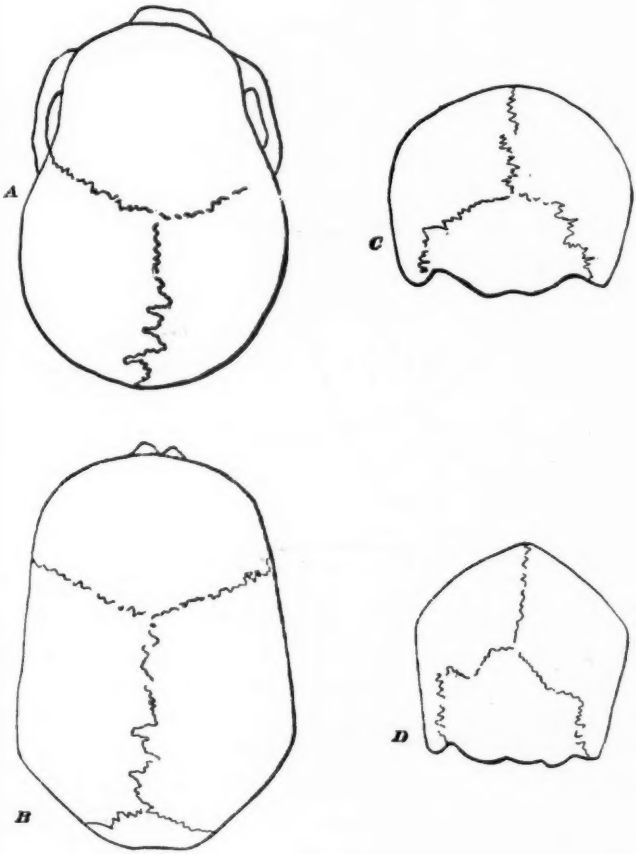
superciliary ridges, occipital protuberance and zygomatic arches, the latter projecting beyond the general contour of the skull like the handles of a jar or a peach basket; and lines drawn from the most projecting part of the arches and touching the sides of the frontal bone are supposed to meet over the forehead, forming a triangle, for which reason the skull is known as pyramidal.

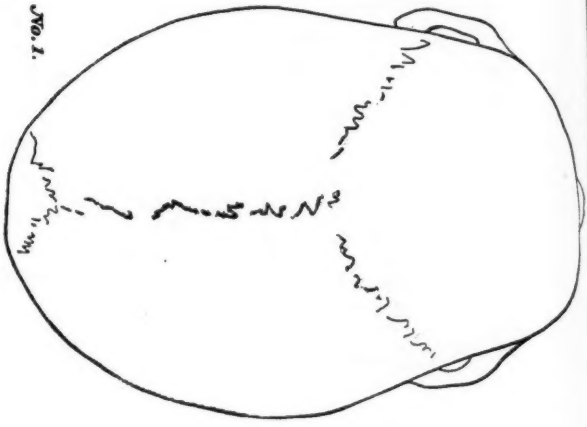
The first specimen, examined from a vertical view, shows something of the typical character as figured in A, and when viewed posteriorly there is noticed a flattening of the parietal walls with an elongated vertex as shown in D; while a second specimen, represented by B, shows none of the foregoing characteristics, the form being elongated and the parietal walls so far overhanging as to conceal the zygomatic arches in the vertical view, so that if lines be drawn as previously mentioned, instead of forming a triangle they may, like the asymptotes of a parabola, be extended to infinity and never meet:

For purposes of comparison a number of orthographic outlines, showing the contour of civilized crania from a vertical point of observation, are herewith annexed. No. 1 is that of an eminent mathematician who committed suicide; No. 2, a prominent politician during the civil war; No. 3, a banker; and No. 4, a notorious assassin. Nos. 5 and 6 are negro skulls. Further comparison may be made with the Jewish skull, as represented in No. 7, in which the nasal bones project so far beyond the general contour as to form a bird-like appendage.

A collection of Aleutian heads, as seen from a vertical point of observation, when I looked down from the gallery of the little Greek church at Ounalaska, presented at first

XUM


A
C
B
D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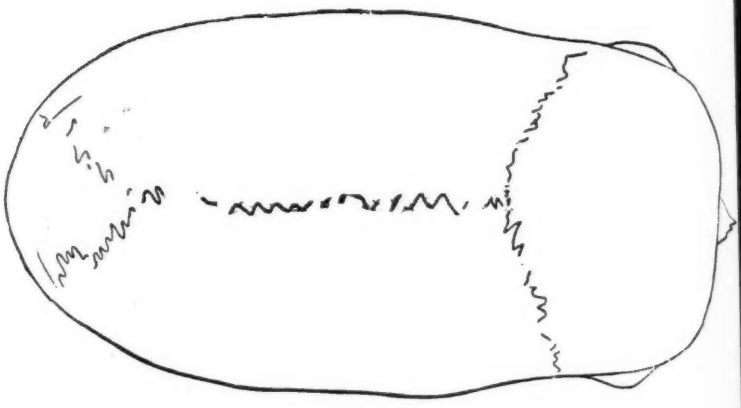
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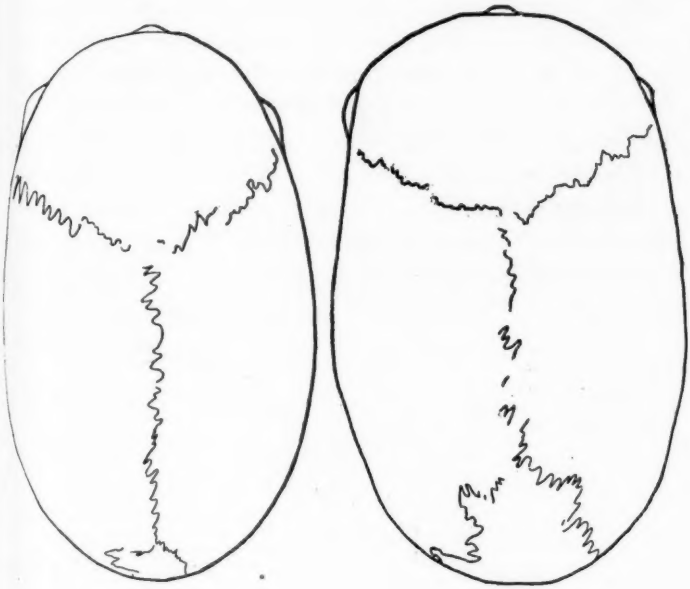
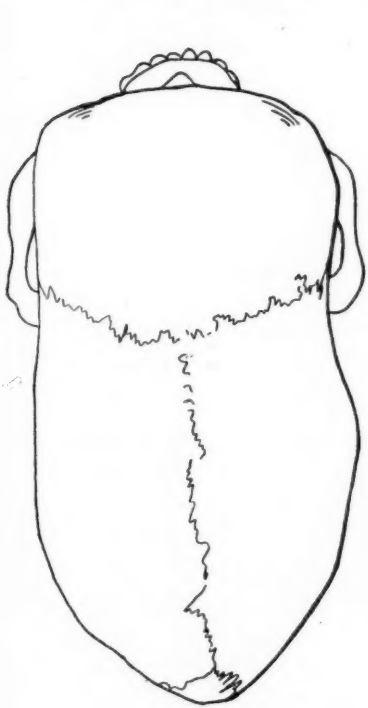


No. 3. No. 4.

certain collective characters by which they approach one another. But anatomists know that a careful comparison of any collection will show extremely salient differences. In fact, individual differences, so numerous and so irregular as to prevent methodical enumeration, constitute the stumbling-block of ethnic craniology. Take, for instance, a number of the skulls under consideration: in proportions they will be found to present very considerable variations among themselves. The skulls figured by A and B are respectively brachycephalic and dolichocephalic. The former has an internal capacity of 1,400, the latter 1,214 cubic centimeters; but the facial angle of each is 80°, and in one Eskimo cranium it runs up to 84°. If the facial

angle be trustworthy, as a measure of the degree of intelligence, we have shown here a development far in excess of the negro, which is placed at 70°, or of the Mongolian at 75°, and exceeding that observed by me in many German skulls, which do not, as a rule, come up to the 90° of Jupiter Tonans or of Cuvier, in spite of the boasted intelligence of that nationality.

In none of the skulls of the collection is there observable the heavy superciliary ridges alleged to be common in lower races, but which exist in many of the best-formed



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No. 6.

European crania—shall we say as anomalies or as individual variations? Nor is the convexity of the squamo-parietal suture such as characterizes the low-typed cranium of the chimpanzee or the Mound Builder. On the contrary, the orbits are cleanly made and the suture is well curved. Besides, a low degree of intelligence is not shown by observing the index of the foramen magnum, which is about the same as that found in European crania; and the same may be said of the internal capacity of the cranium. To illustrate the latter remark is appended a tabular statement made up from Welcker, Broca, Aitken and Meigs:

	Cubic centimeters.
Australian	1,228
Polynesian	1,230
Hottentot	1,230
Mexican	1,296
Malay	1,328
Ancient Peruvian	1,361
French	1,403 to 1,461
German	1,448
English	1,572

An average of the Eskimo skull, some of which measure as much as 1,650 and 1,715 c. c., will show the brain capacity to be the same as that of the French or of the Germans. None of them, however, approaches the anomalous capacities of two Indian skulls on exhibition at the Army Medical Museum, one of which shows 1,785 c. c., and the other the unprecedented measurement of 1,920 c. c.

If the foregoing means for estimating the mental grasp and capacity for improvement be correct, then we must accord to the most northern nation of the globe a fair

No. 7.

degree of brain energy—potential though it be. Aside from the mere physical methods of determining the degree of intelligence, it is urged by some writers, among them the historian Robertson, that tact in commerce and correct ideas of property are evidence of a considerable progress toward civilization. The natural inference from this is that they are tests of intellectual power, since mind is a combination of all the actual and possible states of consciousness of the organism, and an examination of the Eskimo system of trade draws its own conclusion. Their fondness for trade has been known for a long time, as well as the extended range of their commercial intercourse. They trade with the Indians, with the fur companies, the whalers and among themselves across Bering straits. Many of them are veritable Shylocks, having a through comprehension of the axiom in political economy regarding the regulation of the price of a thing by the demand.

XUM

THE MORAL SENSE AND THE RELIGIOUS INSTINCT.

With the aptitudes and instincts of our common humanity Eskimo morals, as manifested in truth, right and virtue, also admit of remark. Except where these people have had the bad example of the white man, whose vices they have imitated, not on account of defective moral nature, but because they saw few or no virtues, they are models of truthfulness and honesty. In fact their virtues in this respect are something phenomenal. The same cannot be said, however, for their sexual morals, which, as a rule, are the contrary of good. Even a short stay among the hyperboreans causes one to smile at Lord Kames's "frigidity of the North Americans," and at the fallacy of Herder who says, "the blood of man near the pole circulates but slowly, the heart beats but languidly; consequently the married live chastely, the women almost require compulsion to take upon them the troubles of a married life," etc. Nearly the same idea expressed by Montesquieu, and repeated by Byron in "happy the nations of the moral North," are statements so at variance with our experience that this fact must alone excuse a reference to the subject. So far are they from applying to the people in question that it is only necessary to mention, without going into detail, that the women are freely offered to strangers by way of hospitality, showing a decided preference for white men, whom they believe to beget better offspring than their own men. In this regard one is soon convinced that salacious and prurient tastes are not the exclusive privilege of people living outside of the Arctic Circle; and observation favors the belief in the existence of pederasty among Eskimo, if one may be allowed to judge from circumstances, which it is not necessary to particularize, and from a word in their language signifying the act.

Since morality is the last virtue acquired by man and the first one he is likely to lose, it is not so surprising to find outrages on morals among the undeveloped inhabitants of the north as it is to find them in intelligent Christian communities among people whose moral sense ought to be far above that of the average primitive man in view of their associations and the variations that have been so frequently repeated and accumulated by heredity; and where there is no hierarchy nor established missionaries it is still more suprising to find any moral sense at all among a people whose vague religious belief does not extend beyond Shamanism or Animism, which to them explains the more strange and striking natural phenomena by the hypothes is of direct spiritual agency.

It must not be understood by this, however, that these people have no religion, as many travellers have erroneously believed; that would be almost equivalent to stating that races of men exist without speech, memory or knowledge of fire. A purely ethnological view of religion which regards it as "the feeling which falls upon man in the presence of the unknown," favors the idea that the children of the icy north have many of the same feelings in this respect as those experienced by ourselves under similar conditions, although there is doubtless a change in us produced by more advanced thought and nicer feeling. On the other hand, how many habits and ideas that are senseless and perfectly unexplainable by the light of our present modes of life and thought can be explained by similar customs and prejudices existing among these distant tribes. Is there no fragment of primitive superstition or residue of bygone ages in the supposed influence of the "Evil Eye" in Ireland, or in the habit of "telling the

bees" in Germany? Is there not something of intellectual fossildom in the popular notion about Friday and thirteen at table, and in the ancient rite of exorcising oppressed persons, houses and other places supposed to be haunted by unwelcome spirits, the form of which is still retained in the Roman ritual? And is not our enlightened America "the land of spiritualists, mesmerism, soothsaying and mystical congregations"?

When the native of Saint Michael's invokes the moon, or the native of Point Barrow his crude images previously to hunting the seal, in order to bring good luck, is not the mental and emotional impulse the same as that which actuates more civilized men to look upon "outward signs of an inward and spiritual grace," or not to start upon any important undertaking without first invoking the blessing of Deity? And are not the rites observed by the natives on the Siberian coast, when the first walrus is caught, the counterpart of our Puritan Thanksgiving Day?

Perhaps the untutored Eskimo has the same fear of the dangerous and terrible, the unknown, the infinite, as ourselves, and parts with life just as reluctantly: but it cannot be said that our observation favors the fact of his longevity, although long life seems to prevail among some of the circumpolar tribes, the Laps, for instance, who, according to Scheffer, in spite of hard lives enjoy good health, are long-lived, and still alert at eighty and ninety years.—(De Medecina Laponum.)

Owing to his hard life, the conflict with his circumstances and his want of foresight, the Eskimo soon becomes a physiological bankrupt, and his stock of vitality being exhausted, his bodily remains are covered with stones, around which are placed wooden masks and articles that

have been useful to him during life, as I have seen at Nounivak island, or they are covered with driftwood as observed in Kotzebue sound, or as at Tapkan, Siberia, where the corpse is lashed to a long pole and is taken some distance from the village, when the clothes are stripped off, placed on the ground and covered with stones. The cadaver is then exposed in the open air to the tender mercies of crows, foxes and wolves. The weapons and other personal effects of the decedent are placed near by, probably with something of the same sentiment that causes us to use chaplets of flowers and immortelles as funeral offerings—a custom that Schiller has commemorated in "Bringet hier die letzen Gaben."

The future destiny of these people is a question in which the theologian and politician are not less interested than the man of science. Some observers seem to think that their numbers are diminishing under the evil influence of so-called civilization. But as every race participates in the same moral nature, and the entire history of humanity, according to Herder, is a series of events pointing to a higher destiny than has yet been revealed, there is no reason why the sum of human happiness, under proper auspices, should not be increased among the Innuit race. Archdeacon Kirkby, a Church of England clergyman who has lately visited them in a missionary capacity as far as Boothia, speaks in the highest terms of their intelligence and capacity for improvement. Here, then, is a brilliant opportunity for some one full of propagandism and charity to repeat the acts of the modern apostles and extend the influence of civilization to the gay, lively, curious and talkative hyperboreans whose home is under the midnight sun and on the borders of the Icy Sea.

Journal American Geographical Society Vol. XV. 1883.
Publication N°VI. Plate.
ARCTIC OCEAN
North of Behring Strait
WRANGEL ISLAND
As surveyed by the Officers of the USS Rodgers
Lieut. R.M. Berry commanding
September 1881
Cook Inlet
Behring Strait
Point Barrow
Herald Isld.
Herald Shoal
Plover Bay
Cape Thompson
Cape Serdze
Cape Blossom
Cape Lisburne
Cape Wankarem
Cape Schmidt
Cape Serdze
Cape Chaplin
Cape Navarin
Cape Olyutorsk
Cape Kamchatka
Cape Lopatka
Behring Sea
Behring Strait
Arctic Ocean
Wrangel Island
Herald Island

THE VALLEY OF THE LOIRE

AND ITS

HISTORIC CHATEAUX.

BY

GENERAL GEORGE W. CULLUM, U. S. ARMY.

Vice-President of the Society.

The Loire, the largest river of France, rises near Gerbier des Joncs in the wild Cervennes, Department of the Ardèche, from a height of 4,711 feet above the sea, whence it winds its sinuous way, for more than 600 miles, to the Atlantic. It has many tributaries, the chief being the Allier, Cher, Indre, Vienne, Maine, and Seore, which, together, drain one-fourth of the area of France. This vast Loire basin, geologically, physiognomically and historically, belongs to three distinct regions. The Upper-Loire is a romantic mountain torrent, running northwardly to its junction with the Allier. The united waters of these two rivers, constituting the Middle-Loire, flow in a wide valley, from near Nevers, to Tours, in a semi-circular course, through what is justly called the "Garden of France," its soil being made up of sands, clays and marls, like the tertiary lake-basins of Paris. The Lower-Loire, running westwardly, after excavating a wide bed in the schists of Angers, flows through the granite regions of Poitou and Brittany and enters the Bay of Biscay by a wide estuary below St. Nazaire.

The rapidity of the Loire's flood current and the mountainous character of the region of its upper waters, cause the vast quantities of gravel, sand and alluvium, brough

down, to form bars and obstacles to its flow. To obviate these difficulties, large sums of money and much engineering skill have been expended to improve its navigation. The left bank is usually the steepest from the earth's rotation throwing the excavating channel against it, hence the much flatter right bank requires protecting levees. These embankments, among the most stupendous works of France, were begun as early as the ninth century, and gradually were enlarged till they are now about 25 feet high and 40 at the base, along the whole middle course of the Loire from Nevers to Angers. These barriers usually confine the river within its banks and exclude its waters from a tract of country 100 miles long and 30 to 40 in breadth, which was formerly a morass. However, the narrow channel, less than a thousand feet wide, is at times insufficient to hold the accumulated waters, which sometimes burst their bounds and spread wide their devastating floods, as in 1841, 1856 and 1866. This seems impossible to those who, like ourselves, looked in Summer upon this sluggish streamlet, more of sand than water. Half of the year navigation is interrupted by droughts, overflows and ice ; but during the other half navigation is practicable downwards from Noirie, and upwards to Roanne. The tide is perceptible above Nantes, and vessels of 300 tons can discharge at Paimbœuf. The navigation of the Lower-Loire, much obstructed by shifting sands, is assisted by the *Canal lateral à la Loire;* and canals also connect this stream with the Saône, Seine, and Vilaine.

This great river, which nearly equally divides France, possesses important strategic advantages for the realm; and, in and near its basin, have been the battle-grounds of great contending hosts. The Franks passed through this

region when warring against Aquitania and the Visigoth kingdom, destroyed by the decisive battle of Vouillé in which Clovis slew Alaric; it was at Miré, near Tours, that Charles Martel defeated Abderrahman, thereby rescuing Christendom from Moslem domination; at Poitiers was fought one of those great battles of the Hundred Years' War for the succession of England to the throne of France; at Orleans Joan of Arc entered the city, in 1429, in the teeth of the vastly superior English army; along the Loire are those famous Chateaux so memorable in the history of the Valois kings and their successors; at Jarnac fell Condé leading his brave Protestants against the Catholics; in the Vendée was the sanguinary struggle of three long years between Royalists and Republicans; behind the Loire, Davoust sought refuge with the defeated army of Waterloo; and after the battle of Villerceau or Beaugency, the great river became the barrier to the German invasion of 1870–71, and the base for French operations during the closing period of the war.

The source of the Loire is in the volcanic plateau of Velay, covered with lavas vomited from one hundred and fifty, though now scarcely distinguishable, craters. These lava streams have frequently blocked up the valley of the river, which, in scooping out a new channel, has frequently laid bare magnificent columns of basalt. One of the grandest of these defiles is that at Chamalières, a cañon excavated in granite, and basaltic lava to the depth of nearly a thousand feet. The volcanic formations, in the vicinity of picturesque Puy, of high columns of basalt, huge dykes and broad sheets of lava, are best known. Close to the black houses of the town, the "Needle" of St. Michel—an obelisk of lava—and the rock of Corneille, raise their lofty

heads. Beyond are the columns of basalt of La Denise, known as the "Cross of Straw," and the "Organ" of Espaly, where were discovered fossil remains of animals and two human skeletons, probably contemporaneous with the eruption of these extinct volcanoes. Around Le Puy, the chief industry of whose 20,000 inhabitants is the manufacture of point and blond laces, every available spot is covered with vegetation. During the Middle Ages it was a great place of pilgrimage, even for popes and kings, who often visited its venerable Romanesque cathedral, the old chapel of St. Michel, and particularly the miracle-working statue of the Virgin surmounting the summit of the rock of Corneille, 2,484 feet high. The new town, besides its public monuments, contains a valuable museum rich in local antiquities.

Passing by the dismantled walls of the Castle of Polignac, of Roche-Lambert, so admirably described by Georges Sand, and other feudal strongholds dismantled by Revolutionary fury, we leave behind us a desolate wilderness of lava-fields, savage defiles, "antres vast and deserts idle, rough quarries, rocks and hills" piled up in inextricable confusion. After seeing the deep and picturesque gorge of the Langon, a small tributary of the Loire, we meet with landscape scenery quite Alpine in character, and come to the coal basin of St. Etienne, one of the most productive in France, and giving occupation to the 120,000 inhabitants of this continental Birmingham. The whole country is alive with mills, and at Andresieux large quantities of coal are embarked on the Loire for the supply of central and western France.

Except the ruins of the old Castle of Montroud, nothing of special importance is to be seen till we reach the old

decayed town of Feurs, which occupies the site of one of the important cities of the Gauls, identified by extensive fragments of Roman walls, aqueducts, inscribed stones, &c. Six miles below, confining the Loire between huge dykes, is the Mole de Piné, faced with heavy stones cemented and clamped together, the construction of which is attributed to the Romans. The rapids thus produced prevent the ascent of boats beyond Roanne, a cotton manufacturing town, which consequently enjoys a large transit trade.

Vichy on the Allier, about thirty miles westward of the Loire, is one of the most frequented watering-places in Europe, being annually visited by about 25,000 invalids to use the waters, which vary in temperature from 57° to 113° Fahrenheit, and have, as Sam. Weller would say, a remarkable flavor of soda-water and hot flat-irons. The season begins in the middle of May and lasts till October. In the vicinity are some old castles and much picturesque scenery.

From Vichy and Roanne, the Allier and Loire, after running through an interesting region filled with busy life and memorials of past history, meet at Nivers, a place which enjoyed some importance in the time of Julius Cæsar, but now is chiefly noted as the location of the Government arsenal for the manufacture of ordnance and artillery carriages.

The Loire, here much increased in volume, winds past the ancient watch-towers and ruined monastery of La Charité; the Chateau de Courselles, once belonging to the bold Scot—Marshal Macdonald; Briare, where begins Sully's canal to the Seine; Gien, lower down, where the great minister of Henry IV. passed the latter years of his

life, and in which Voltaire wrote several cantos of the Henriade; the fine old church of St. Bénoit, and the remains of the handsome Châteauneuf; and the old walls of Jargeau, to which a few English soldiers fled after the siege of Orleans, and where, in storming a breach made by the French, the Maid, mounting a ladder, was struck down by a stone into the ditch, but, recovering, carried the place banner in hand.

We have now reached the famous city of Orleans, a great commercial centre and strategic point on the Loire, through which pass great highways to southern France, Spain and Switzerland. Here we are among the blooming orchards, golden vineyards, and the waving cornfields of this granary of the nation, breathing its genial air and basking among its sunny landscapes. Orleans is now a modern town, and almost every memorial of its heroine—Joan of Arc—has been swept away, though her statue is yet in the Place des Martroy, and, near by, is her house, as are also those of Agnes Sorel and Diana of Poitiers. The cathedral, in the flamboyant Gothic style, is the finest structure in the city, and in the Mairie, close at hand, died the insignificant Francis II., husband of Mary, Queen of Scots.

Descending the willow-fringed Loire, near its left bank is the church of our Lady of Cléry, in which Louis XI. was buried; below, on the opposite bank, at Beaugency, was fought a great battle, which might have been a victory for the French but for the orders of Gambetta, then Minister of War; and at Mer we begin the tour of the famous Chateaux, with which are connected some of the glories, but more of the shame of the sixteenth and seventeenth centuries.

Chambord, the Versailles of La Touraine, is in an extensive forest park on the Cosson, a tributary of the Loire,

which was turned fifteen miles from its course to bathe the chateau's fortress walls. This grand edifice, of commingled feudal castle and sumptuous palace, was the work of the chivalrous king, Francis I., knighted by the hand of Bayard. He began the era of modern France, the great age in which occurred the Reformation, and in which lived the greatest sovereigns—Pope Leo X., the Emperor Charles V., Henry VIII. of England, the Sultan Solyman, Sigismund of Poland, &c. This, too, was the age in which the Renaissance of Greek and Roman antiquity came in, and altered the originality of the earliest productions of the Middle Ages, while it gave to literature and art a glorious impetus throughout Western Europe. The memorials and monuments of classical civilization, which were suddenly removed on the fall of the Greek Empire to Italy, Francis I., with an intuitive taste for the grand and beautiful, introduced into France after his conquests in that land of art. Their purity of design, elaborate ornamentation, wealth and beauty of color, and graceful forms delighted the sensuous soul of the royal patron of Cellini and Da Vinci, and the venerator of the genius of Michael Angelo. He had a mania for building fairy palaces, not only on lovely islands in the Indre, as we see in Azay-le-Rideau, but, even upon the sandy and humid plain of Sologne, where he erected his magnificent Chambord. In this latter turreted and moated fortress home, he lavished every device and decoration to achieve a masterly combination of all that was gay, bright and picturesque in architecture; hence it partakes more of the fanciful Italian palace than the embattled castle of the Middle Ages.

The form of this fantasy of stone, occupying the site of the sombre old fortress knocked down by Francis I., is a

rectangle over 500 feet long and nearly 400 wide, with massive towers at each angle, sixty feet in diameter. Within, in the middle of the principal front, stands the great donjon, 170 feet square, also with heavy flanking towers whose pointed roofs are surmounted with ornamental turrets. The donjon is divided, on each floor, into four equal divisions, by four *Salles des Gardes*, forming the arms of a Greek cross, at the centre or junction of which is the grand staircase with two independent flights of spiral stairways: in itself a *chef-d'œuvre* of art from its boldness, fine proportions, delicacy of details, and great elevation. Its soaring "*lanterne*" summit, some 200 feet high, crowned with a colossal stone *fleur-de-lys*, towers majestically over a forest of pinnacles, conical domes, sculptured chimneys, and bold buttresses, which, in variety and grouping, are the triumph of this architectural monument. In addition to this magnificent stairway there are in the castle twelve others to ascend to its top, besides many more in the thicknesses of its walls. It would require a volume to give an architectural anatomy of this imposing edifice which contains nearly half a thousand spacious rooms, many of which are vast salons once filled with rich furniture, beautiful tapestries, choice books costly pictures, and adorned with elaborate frescoes, stately sculptures and all the resources of art, of which now little remains save the initial F of the King and his salamander in flames alternating in the panels of the ceilings and roof. In pacing its deserted halls and tenantless chambers it seems impossible that here was once assembled the wit, poetry and intellect of a cultivated age; that here, in broad sombrero fringed with gold and looped up with priceless jewels, once stood Francis I., the cynosure of ad-

miring eyes; that around him were princes in their richest embroideries, knights and courtiers habited in costliest stuffs, and ladies in Eastern silks and sparkling with rivières of emeralds and diamonds; that here abounded every luxury, gorgeous mode and extravagant device of a sumptuous court; and that within these walls transpired some of the most momentous events of history. It was hard to realize all this, its sybaritic pleasures and sounds of revelry by night, as we, by the glimpses of the moon, in silence wandered about this enchanted palace so symmetrical and so grand in outline, guarded on every side by Titan towers. At every turn its pinnacles and spires, bathed in lambent light, seemed a fantastic assemblage of whitened spectres stately marching across our path.

The construction of this enormous pile employed eighteen hundred workmen during the whole period of the reign of Francis after his return from captivity in Spain.

> "Lord of the soil,
> His palace rose and kissed the gorgeous clouds,
> Streams bent their current to his will, trees sprung;
> The naked waste put on luxurious robes
> And plains of happy cottages cast out
> Their tenants, and became a hunting-field."

It was in this very palace that, in 1539, the generous Francis munificently entertained his cruel jailor—Charles V. In its "Lanterne," for an observatory, Catherine de Medici, daughter of the second tyrant of Florence, with her astrologer Ruggiero, cast the fatal horoscope of everyone inimical to this Medea of France. Here Molière and his troop performed comedies before Louis XIV. and his court. This was the asylum for eight years (1725–33) of Stanislas, King of Poland, the father-in-law of Louis XV. Here, with all the pomp and circumstance of a conquerer, lived

and died Marshal Saxe—the hero of one hundred battles, including Fontenoy, for which this chateau was his reward. Upon its priceless decorations, emblematical of royalty, the Revolutionary mob wreaked its vengence. With this rich inheritance, under the title of the Principality of Wagram, Napoleon rewarded his Chief of Staff, Marshal Berthier, and from his widow it was purchased by a national subscription and presented to the Duc de Bordeaux, the last descendant of the elder branch of the House of Bourbon, who assumed the title of Comte de Chambord and recently died styling himself Henry V., a king only in name and with a royal residence which he never occupied.

Leaving this classic Chateau of the taste, liberality and power of the modern Augustus, we drove, on a bright May morning, along the banks of the historic Loire to the Castle of Blois, for ages the residence of princes and kings, the haunt of bigotry, and the stage of direful tragedy. It is a picturesque assemblage of the architecture of three great epochs in the thirteenth, fifteenth and sixteenth centuries. After its last occupation by the Valois kings, its towers, turrets, painted windows, and rich apartments, by degrees, became almost ruins, when Duban, under the directions of the government, restored a part of it to its pristine grandeur. It is built on the site of a Roman camp at the confluence of the Arou with the Loire, where, in feudal times, existed a strong baronial castle, whose early checkered history, from the middle of the tenth century, we will pass over. When Charles d'Orleans, captured at Agincourt, was released in 1440, this enlightened prince gave to this massive castle, no longer necessary after the evacuation by the enemy of central France, an entirely new form, converting it into an elegant abode of taste and luxury, of which

there are yet some remains. In 1462, a most important event in its history occurred, Mary of Cleves giving birth to a son who became King Louis XII. of France, called the "Father of his People." Almost all the great political acts of this wise and good sovereign were performed at the Chateau of Blois, where, except when with his army in Italy, he always lived. He, with exquisite taste, richly adorned it, added a magnificent gallery, and made a fine collection of works, which subsequently became the most precious part of the national library at Paris. Here Anne of Brittany, and Claude (wife of Francis I.) died; here, in her tower, the inscrutable, stern and cruel Catherine de Medicis, with her familiar Ruggiero, watched the stars to read the fate of thousands whom she hurried to an untimely grave; here, secret duels and assassinations occurred, and famous edicts and declarations of war were issued; here, convocations of state-councils were held and royal alliances contracted; and here, magnificent fêtes took place and the most pompous ceremonials were celebrated. But of all the terrible tragedies at which humanity shudders, here took place the brutal murder, December 23, 1588, of the Duke de Guise, the head of the Catholic League and aspirant to the throne of the Valois; followed the day after by the assassination of his brother, the Cardinal of Lorraine, a most haughty and unscrupulous churchman and politician.

The imbecile Henry III., forsaken by everyone, tottering on his throne, and alarmed at the popularity of his distinguished generalissimo, more a king than himself in all the requisites of royalty, convoked the States-General. The Guises were to be present at the parliament, and Henry, the better to conceal his perfidy to these princes, partook of the communion with them before the consummation of

his hellish plot, of which tradition has handed down the minutest details. To the traveller is yet pointed out everything connected with those ill-omened horrors—the chamber of Catherine de Medicis, the cabinet of Henry III., where he had distributed the daggers to Loignac and his bravos, the room where the great Balafré fell pierced with more than forty wounds, and the outer apartment where the soulless king brutally spurned the dead body of his illustrious victim. Retributive fate thus ended the life of the murderer of Admiral Coligny, which, in thirteen short days, was followed by the death, in delirium, of Catherine de Medicis, ripe in years as in crime; and, in less than seven months after, a monk's poignard took off (August 2, 1589) the worthless Henry, the Last of the Valois Kings.

On the accession to the throne of the House of Bourbon, Blois lost its importance, Henry of Navarre choosing Paris for his residence, though he often occupied this old castle on his way to his disaffected southern provinces. Subsequently it was mainly used as a place of exile for distinguished State prisoners like Marie de Medicis, widow of Henry IV. and regent after his assassination, though Louis XIV. and other noted personages occasionally occupied it. The revolutionists, in 1793, destroyed all emblems of royalty which decorated the chateau; then it became an infantry barracks; was restored by the government in 1845-48, and presented to the Prince Imperial in 1861; and in the Franco-German war was used for a hospital. What a varied drama of history has it had since the days of the Gauls and the Romans!

At Blois the levée, along the right bank of the Loire, assumes colossal proportions, and upon its broad top is constructed the railroad down the river. Opposite Onzain

station, on a rocky eminence on the left bank of the river, is the picturesque Chateau de Chaumont, with machicolated towers, forming three sides of a square and reflecting its wealth of architecture in the river at its base.

This imposing castle cannot better be described than in the words of the Vicomte Walsh:

"The porch, or portico," says he, "is flanked on either side by two noble towers defending the entrance; hence start two slopes, or declivities, at either extremity of which stand two fortified towers; that on the right still retains upon its *créneles* the astrological and cabalistic signs of the Queen Medicis, whose name it bears; that on the left is called 'La Tour d'Amboise.' * * * * A noble avenue dividing the green-sward now covering the outer moat, which has been filled up, leads in a straight line up to the portico; the large doors are of ancient oak, and on the panels we discern some extremely curious early carving, representing the twelve apostles. If we follow this avenue, we have on our right 'La Promenade des Mottes,' otherwise called 'Le Mail de la Reine,' planted with fine old elms and limes; on the left a wild ravine, rude and untamed, where the rugged oaks have grown spontaneously between the clefts of the stone."

The earlier history of the former castle on this site is stamped with the rapacity and sanguinary characteristics of feudal times, when might made right and spread bloody desolation on every side. We will not attempt to narrate the feuds and valorous exploits of those days. Suffice it to say that this famous stronghold was razed to the ground and rebuilt in the latter part of the twelfth century. Here Cardinal Amboise, the wise Minister of Louis XII., was born; the Prince de Condé, after the battle of Dreux, was

confined ; Voltaire wrote part of " La Pucelle "; and Catherine de Medicis spent much of her time, as usual, in casting horoscopes to conform to her infernal designs against her enemies. After the death of her husband, Henry II., she compelled his once all-powerful mistress to exchange her bijou chateau of Chenonceau for Chaumont, but Diane de Poitiers regarded it with superstitious awe as an ill-omened spot, and never occupied it. In the days of Napoleon I., Madame de Staël resided here in exile for ten years till the restoration of the Bourbons.

Below Chaumont is Amboise, the favorite abode of the warrior king, Charles VIII., on the site of a Roman camp at the confluence of the Amasse and Loire, here divided into two arms embracing the Island of Saint-Jean. As seen from the right bank of the broad river, with this pretty island for a foreground, the half-ruined bridge uniting it to the village of quaint old houses embowered in foliage, and the lofty sombre rock behind crowned with the majestic castle, all together form a picture full of romantic beauty.

The famous Chateau of Amboise, now much reduced in extent, once encircled the flat summit of an elevated rock, nearly precipitous, except the part occupied by the northern terrace facing the Loire. It was a vast and powerful citadel with high perpendicular battlemented walls. Enormous towers, 90 feet high and 42 in diameter, were at either extremity, which sprung from the base of the rock, and through which, on a spiral ramp, carriages could ascend. Subterranean galleries were cut in the solid base, and machicoulis projections and turrets commanded every approach of an enemy. The interior of the chateau retains no traces of its antiquity and few architectural attractions; but the Chapel of St. Hubert, within the well-kept gardens,

light, graceful and delicately ornamented, is in striking contrast to the heavy, massive, imposing and almost gloomy aspect of the castle. This exquisite morsel of florid Gothic was built by Charles VIII., as a token of his affection for Anne of Brittany, and is dedicated to the saint. His miraculous meeting with the stag, bearing the legendary cross between its antlers, is curiously carved over the rich doorway. This and the delicate decorations within seem rather to be executed in ivory than in stone; but the stained Sèvres glass of its windows would be more in keeping with a lady's boudoir than with this gem of sculpture of the fifteenth century.

The chief attractions of Amboise are its eighteen centuries of historic associations, during which occurred many tragic scenes; sieges and battles; bloody butcheries and Machiavelian plots; pompous ceremonials and sumptuous fêtes; and some noted births, marriages and deaths.

Except the treaty between Clovis and Alaric, King of the Visigoths, made in 504 on the Island of Saint-Jean, little of interest occurred at Amboise before the fifteenth century, except that it had been twice sacked. Charles VIII. was born, in 1470, in this castle, and here he was accidentally killed. He was succeeded by Louis XII., who divorced his wife to marry Anne of Brittany, the widow of his predecessor. At Amboise, in the genial sunshine of the love of a devoted mother and idolized sister, Francis I. spent his youth, and in his manhood (1539) here, with Lucullus splendor, he received his cruel jailor, Charles V. of Germany, to whom, with a magnanimity which nothing could surpass, he granted a safe passage through his dominions to the "Fayre Citie of Ghent," then in revolt.

Francis II., who succeeded to the throne of France when

his father Henry II. was killed in a tournament, married, while still a boy, the Scottish rosebud—Marie Stuart—whose renowned beauty, winning manners, and tragic death have filled so many pages of exciting history. The young sovereigns, in 1559, made their brilliant entrance into this their majestic castle; but the pageantry and fêtes, which then graced their advent, had, in a few brief months, an appalling sequel. The Guises, supported by the queen-mother, Catherine de Medicis, the Jezebel of her age, were then the true masters of France. The Huguenots, who desired to extricate the young king from the fangs of this monster, formed what is known as the "Conjuration d'Amboise." The secret of the plot was betrayed by one of the conspirators, and its leader, La Renaudie, was seized and hung upon a gibbet in the centre of the bridge in front of the castle. The remainder of the conspirators were captured, and the triumvirate of Guises and Medicis wreaked their bloody vengeance upon more than twelve hundred victims. The carnage was frightful, the streets were filled with dead bodies, the public places were crowded with scaffolds, blood ran in torrents, and the Loire was choked with corpses. From among the crowds of prisoners, tied together and driven like cattle to the shambles, were reserved the chiefs, who were to be executed, on the northern terrace, for the entertainment of the court. Catherine led the way to the windows o'erlooking the horrid scene, while the Cardinal de Guise designated the victims. The young sovereigns, the younger princes, the entire nobility, and the whole garrison occupying the roofs and every coigne of observation, were compelled to be witnesses of the brutal butchery. Before the densely packed lines of prisoners was erected a scaffold, covered

with black, on which stood an executioner masked and robed in red. Prisoner after prisoner was despatched, till the wearied headsman was compelled to yield his axe to another. When the butchery was over, Catherine, to whom this was rapture, commanded that the remains of the chief conspirators should be hung in chains from the iron balustrades of the stone balcony on the north front of the castle, facing the river. Over this dizzy height of a hundred feet, the headless bodies dangled and swayed, to and fro, in the wind, till the stench became so overwhelming that even Catherine was obliged to leave the chateau and escape, with Francis and Mary, to Chenonceau. Such was the prelude to the more horrible tragedy of St. Bartholomew in 1572.

Amboise henceforth ceased to be an abode of pleasure to become a state-prison. The first who were condemned to occupy its gloomy cells were the near relatives of the Guises, who had just triumphed. After them came the Marquis of Vieuville, in 1624; the Princes of Vendôme, natural sons of Henry IV., in 1646; Fouquet and Lauzun, in 1661; and, finally, Abd-el-Kadir, till released by Louis Napoleon, in 1852. To these hoary towers and ancient battlements, as to other kingly habitations, came the terrible and devastating Revolution to pursue with rage every souvenir of royalty. During the Consulate of Napoleon, Sièyes and Roger-Ducos, the latter destroyed much of the castle and the church of Saint Florentin, giving as an excuse for his vandalism that he was frightened at the necessity of repairing and keeping these long-neglected structures in good condition. The Comte de Paris who inherits the castle, as the descendant of the Ducs de Penthièvre, is restoring it; but the town of Amboise is now only a city of tanneries,

all memorials of Charles VIII., Louis XII., Francis I., Charles V., Leonardo da Vinci, and other great names having been obliterated.

Near the famous chateau are the Granaries of Cæsar, made by excavating the solid rock, or by enlarging natural fissures, which were the storehouses for his vast supplies of corn after conquering the Gallic confederation; the Church of Saint Denis, in the circular style of the twelfth century, containing a well-executed terra-cotta group, representing the entombment of the Saviour ; and the Chateau de Cloux-Lucé, where Leonardo da Vinci lived the last two years of his life.

In the forest of Amboise once stood the magnificent Chateau of Chanteloup, built in the thirteenth century by order of the Princess des Ursins, who, not content with tacitly reigning in Spain, had the ambitious project of profiting by the peace of Utrecht to secure for herself a small sovereignty in the Netherlands contiguous to the French frontier, which she expected to exchange for one in La Touraine. So sure was she, that she purchased a site near Amboise, and sent orders to erect upon it a vast and superb edifice with immense inner courts, extensive grounds, beautiful gardens and magnificent furniture. The fall of this aspiring woman prevented her from occupying the chateau, which became the property of her daughter, whose husband sold it in 1760 to the Duke of Choiseul. Ten years later this distinguished Prime-Minister was banished by Louis XV., but his journey to his estate was a magnificent triumphal procession. To mark the success of his popularity he caused, in 1775–78, a grand monument, in the form of a Chinese pagoda, to be built from materials from the Chateau de la Bourdaisière, in which Gabrielle d'Estrées was born.

It was about 130 feet high, in seven stories, diminishing in diameter to the top one, whose conical apex, crowned with a gilt ball, is still visible at a great distance over the surrounding forest. On the death of the Duke this chateau became the property of the Crown, and subsequently was given to the Duke of Penthièvre. After the Revolution it belonged to Count Chaptal, the distinguished chemist and Minister of Napoleon I., who established here a refinery of beet sugar. It was demolished in 1830 by "*la bande noire*," so that nothing remains now to recall the great Prime-Minister, except his pagoda monument, in the first story of which are inscribed, on a marble table, the names of his illustrious visitors during his banishment.

Proceeding ten miles southwestwardly we reach the picturesque valley of the Cher, filled with souvenirs of art, literature and history, at every step stumbling o'er memories of the past, hearing from every ruin the echo of great names, and listening to every wind to bring back the refrain of some battle-cry of the departed days of chivalry.

Suddenly, on reaching the Cher, there rises before us the half palace, half chateau of Chenonceau, unique alike in its situation, construction and history. It is still as fresh and beautiful as when, on the death of Henry II., the fair Diane de Poitiers was compelled to abandon her favorite retreat to the terrible Catherine de Medicis, who, since her wedding day, had coveted this Naboth's vineyard. This venerable monument of the Renaissance, spanning the river and confronting us with memories of mediæval days, is a picturesque mass of lofty walls, peaked roofs, ornate chimneys, beetling towers, hanging balconies, bold buttresses, pillared arches, graceful doorways and pointed turrets.

To see Chenonceau from its most advantageous point of

view, the lover of art should survey it from the south bank of the Cher, below the outer court and diagonally opposite to its donjon. Here the chateau, bridging the river and displaying two of its faces, appears in all its grandeur. The eye wanders with delight over the great square pavilion which majestically rises, above the waters, upon the graceful bridge connecting it with the left bank; and upon the long façade of the gallery which reaches to the opposite shore. The square pavilion, built upon two enormous bridge-piers and their connecting arch, is protected at the angles by projecting towers, producing a charming effect, and its lofty roof is crowned with rich dormer-windows, pointed pinnacles and sculptured chimneys. Such was the primitive, beautiful chateau as designed by Bohier. The bridge which now connects it to the north shore has three unequal arches supported upon massive piers, beneath which we see reflected in the water the charming landscape beyond, while the chateau itself seems a fantastic castle floating in mid-air and mirroring itself in the glassy stream below. The lower gallery, built over these three arches since the erection of the original structure, is two hundred feet long, and its façade is artistically broken up by three colossal semi-circular hollow buttresses pierced with arched windows, which rise from the ends of the bridge-piers to the height of the first story of the gallery. But, notwithstanding this relief to its monotony, this new addition appears somewhat heavy, and is in striking contrast with the grace and delicacy of the Bohier pavilion.

Before we reach the drawbridge of the castle there boldly rises before us the stately tower of the twelfth century, at that time only a simple manor belonging to the family of the Marques—an Auvergnat race of ancient renown, wealth

and power. With its conical lantern roof, and its lesser engaged-towers on its circumference, it is a striking object and greatly heightens the effect of the castellated front of the pavilion.

The details of the chateau are as beautiful as the masses are grand. The jutting towers with their conical roofs, no longer needed for defence, become imposing ornaments; the noble entrance, once a castle gate, has now sculptured doors beneath a hanging balcony; projecting machicolis are transformed into corbeled entablatures; protuberant bartazans have changed to decorative turrets; its dormers have ceased to be lookouts upon the enemy, and even the chimneys, the despair of architects, are culminations of loveliness. In fine, the palace has usurped the purposes of the fortress, and the river, no longer needed as moat and defence, is now but the crystal mirror glassing its kaleidoscope beauties and mould of form.

We will not enter into a detailed description of its interior apartments, which, as in most palaces, have their fine sculptures, delicate arabesques, frescoed ceilings and a profusion of carvings. The throne-room; Gothic chapel, with its beautiful tribune; fine library; grand stairway; vaulted hall, hung with armor; and even the kitchens, are worthy of observation. Most of its old furniture, cabinets, china, enamels and glass are still preserved, as also the drinking-cup of Francis I. and the Venetian mirror and rich furniture of Mary, Queen of Scots, when wife of Francis II.

The history of Chenonceau is very interesting. At the beginning of the thirteenth century, or earlier, the seigniory of Chenonceau was possessed by the family of the Marques. During the many succeeding years of domestic and foreign warfare, Chenonceau was burned, and in 1432

the great advanced tower, as we now see it, was built. One of the descendants of the Marques also built in front of it a defensive water-mill commanding the Cher. When the Marques became embarrassed in their finances, Chenonceau was sold to Thomas Bohier, Chancellor of the Exchequer, who, in 1515, began a new chateau, on the site of the ancient edifice and mill, in the French Renaissance style. In 1535 it was purchased by the Crown, and became a royal residence. Henry II. gave it to his mistress Diane de Poitiers, with the title of Duchess de Valentinois, who continued the building by extending the bridge to the north bank of the river, and erecting thereon a handsome, but less quaint and attractive, two-story structure, thereby to render it the rival of the most gorgeous of the royal palaces. Hither her royal lover used to repair after hunting in the neighboring forest. Her initial, D, joined with his, H—thus DI—was everywhere to be seen; but, in the midst of her labors of tasteful embellishment of the chateau and its exterior by adding a vast parterre of lawns and flower-beds ornamented with groves, grottos and fountains in the Italian style, the King was killed in a tournament. The unscrupulous and irritated Catherine de Medicis, now possessed of supreme power, at once compelled Diane, in the midst of the improvements of her fairy kingdom, to exchange her exquisite chateau for the less attractive one of Chaumont.

Upon the succession of the queen-mother to Chenonceau, it was for thirty years (1559–89) the arena of festivities, pleasures and artistic works. The fêtes began soon after the terrible days of Amboise, which we have narrated. To withdraw the young King and Queen from the horrid memories of recent bloody butcheries, the queen-mother took

them to the bright palace and sunny gardens of Chenonceau, where they had a splendid reception. Triumphal arches, monumental columns and statues, leaping fountains, antique altars, fireworks and the thunders of artillery, all kinds of courtly devices and poetic inscriptions, contributed greatly to give to this fête the stamp of magnificence, novelty and refined art. The long gallery on the bridge was one vast banqueting hall, and through its open windows came the perfumes of flowers, voluptuous music, and the merry voices of revellers. Among the distinguished throng was the arch demon herself—Catherine de Medicis—and her "*escadron volent*" of forty fair frailties designed to serve her political intrigues by fascinating alike Huguenots and Catholics. Next of note was Marguerite, her sparkling daughter, who was forbidden to love the handsome and renowned Balafré, Duc de Guise, then seeking her, because it suited the mother's selfish schemes that she should become the Aspasia wife of Henry of Navarre. The young sovereigns, a bevy of princes, and many nobles in richest vestments were present. Tasso, sad and careworn, was there, with other famous poets; and cardinals, courtiers and many other noted characters graced the brilliant assemblage. The grand banquet to celebrate the ascent of Henry III. to the throne, and the after displays of magnificence, which followed at brief intervals, it is unnecessary to detail.

Catherine de Medicis was much attached to Chenonceau, where she spent most of the time she could spare from intrigues and state affairs. She had brought from Italy masterpieces of statuary and painting, and made the most lavish expenditures to adorn this superb chateau and its parks and gardens. Upon her death, she bequeathed

the whole property to the widow of her son, Henry III., who, for a time, was dispossessed of it by the creditors of the estate, but she finally redeemed it by the sale of her jewels. Upon the demise of Louise de Lorraine it fell into the possession of the Duchesse de Vendôme and the Condés; in 1720, it was sold to the Duc de Bourbon, Prime Minister of Louis XV., and, in 1733, became the property of Charles Dupin, *fermier-general.* Under the latter and his accomplished wife, Chenonceau was again a brilliant abode, where all the literary men of the time assembled, notably Buffon, Condillac, Fontenelle, Bernardin de St. Pierre, Voltaire, Bolingbroke and Rousseau. Owing to the respect which the aged Madame Dupin commanded, this chateau escaped the fate of most other royal residences during the days of the iconoclasts of the French Revolution. The chateau now belongs to Comte Réné, grandson of Madame Dupin.

From Chenonceau we proceeded south to Saint-Quentin, on the summit of a hill overlooking a most lovely landscape. Now crossing the Indre we traverse the wild forest, once the hunting ground of royalty, and debouch from it upon Loches, one of the most picturesque towns in Touraine. It rises in terraces each dominated by striking monuments, the lowest by the Chateau of Louis XII., with its fine towers; the second by the Collegiate Church of Notre Dame and its four pointed pyramids; while the imposing old donjon crowns its summit. Passing over velvet lawns, through beautiful gardens, among quaint old houses, and near the remains of the Gallo-Roman aqueduct of Contré, we enter Loches by the gate of the Cordeliers, standing like the ruins of a small feudal fortress with drawbridge, portcullised entrance, machicoulis defences, loop-

holed towers flanking its four faces, and high-pointed roofs gracefully terminating the whole.

Loches, probably founded before the days of Cæsar, after belonging to the first kings of the French monarchy, passed in feudal times under the domination of the dukes of Aquitaine, and then under that of the turbulent counts of Anjou, who added much to its fortifications. From the accession of Henry II. to the throne of England, the Chateau of Loches belonged to the Plantagenet kings; was taken, in 1194, by Richard Cœur de Leon, after his captivity, from his brother, John Lackland; and was finally, in 1206, reunited to the French crown by Philip Augustus. It was occupied and considerably enlarged by Charles VII., Louis XI., Charles VIII., Louis XII., Francis I. (who here received Charles V. of Germany, December 12, 1539, on his way through France), Henry II. and Charles IX., with whom, in 1571, came his mother Catherine de Medicis and Henry of Navarre.

The castle consists of a pile of buildings of various ages from the year 1000. The most conspicuous is the vast square Donjon with massive walls, rising at the extremity of a rocky plateau to the height of 120 feet and overhanging the precipice. Attached to it is a smaller and lower one serving as the stairway entrance to the four stories of the donjon; and beside it rises a picturesque group of towers of the thirteenth century, in one of which are the dungeons of Louis XI., four stories deep. Two of them contain the iron cages invented by Cardinal Balue, who himself was confined in one of them for eight years; and in another Lodovico Sforza, the Duke of Milan, was a prisoner till he died. In these gloomy, grated dungeons many other illustrious men passed years of misery terminated only by their cruel exe-

cution. These dread abodes of human torture existed as living graves of their victims till the beginning of the French Revolution.

There are many other interesting architectural remains in and about this bastile of sighs and tears; the most interesting, perhaps, being the black marble tomb of the devoted mistress to Charles VII., the beautiful Agnes Sorel, upon which lies her recumbent statue with two angels supporting the head, and two lambs, symbolical of her gentleness, crouched at the feet.

To the east of Loches are the Chateaux of Sansac and Montresor, and the ruins of Charteuse du Liget, founded, in 1176, by Henry II., of England, to expiate the murder of Thomas á Becket; but we must pass them by and hasten to Tours through the valley of the Indre, one of the most fertile regions of Touraine, known even to the Romans, who here built their habitations in the midst of crystal waters, emerald meadows, groves vocal with birds, and swelling hills fringing the stream. At Courçay the river runs through a narrow cañon of steepy and savage rocks alive with noisy torrents. At Cormery, we pass its pretty white stone cottages nestling among the shadows of the venerable ruins of its moss-grown abbey; and beyond, the landscape is delicious till we reach the arid plain of Montbazon, whose only monument is its old chateau, this being one of the girdle of castles which enveloped Tours during the fierce and bloody contests between the houses of Blois and Anjou.

We have now reached the capital of Touraine, the Arcadia of France, through which flows the yellow Loire, its four great tributaries, and a multitude of little affluents, giving fertility to this garden land basking in beauty. Every-

where are pastoral valleys filled with villages and hamlets embowered in verdure; hillsides glowing with purple grapes and ripening fruits; gardens and flowers enameling the plains; battlements and chateaux crowning almost every height; ruins and abbeys covered with creeping vines; vistas and landscapes of loveliness perpetually opening to view; and happy inhabitants rejoicing in the mildness of their clime, the production of everything sacred to Ceres and Bacchus, the grandeur of their monuments, and the antiquity of their history.

Tours was a city of the Gauls, probably a century before the conquest of Cæsar. The Romans held it till 480, and then the Visigoths till 506, when it fell into the hands of Clovis. His successors remained masters of it till 940. Then followed the feudal struggles and wars with England till 1205, when France resumed her sovereignty over this fair domain.

Modern Tours, amid dust and glare and with half of its former population, is situated on the left bank of the Loire and occupies the charming plain between that river and the Cher, which is intersected by broad streets with fine shops and residences on either side. Its public structures are the imposing Gothic cathedral with two lofty towers, founded in 1170 upon the site of a very ancient church; the almost extinct Roman amphitheatre, nearly equal in size to the Colisseum; the ruins of the Gallo-Roman works, which rendered their first service against the Visigoths in 428, and from one of whose remaining towers the Duc de Guise, son of Balafré, escaped in 1591; the two famous towers, the last remnants of the celebrated and vast basilica of St. Martin, so intimately connected with the history of Clovis, Charlemagne and other sover-

eigns of France; the well-preserved church of St. Julien, where Henry III., after the murders at Blois and the death of Catherine de Medicis, convened his parliament in 1589, during the troubles of the League; the Hotel Gouin, a fine specimen of domestic renaissance architecture of the fifteenth century; and the House of Tristan, the ill-omened executioner of Louis XI., ornamented with cord-mouldings, emblematic of his profession. Near the Hotel de Ville and Musée is the fine statue of Descartes fronting the great stone bridge across the Loire, which leads us to the northern bank upon which are the crumbling foundations of the once magnificent Abbey of Marmoûtier.

To the west of Tours, on the vast plain between the Cher and Loire, stand the ruins of the former simple and severe Chateau du Plessis-les-Tours, the castellated den of the timorous tyrant and bloody bigot—Louis XI.—whose character is so admirably delineated by Walter Scott in "Quentin Durward." Most of his days, after his coronation, here lived this strange and unique figure of history, made up of contrasts, powerful by sheer force of intellect, unscrupulous in the employment of means, and pursuing success as a passion. His contemporaries named him the "universal spider," living in the centre of his web and extending its threads in every direction to secure his prey. He was an absolute king, austere in manners, and without uprightness of character, goodness of heart, or greatness of soul. Implacably he hunted down his enemies and revelled in the vengeance he inflicted upon them, as shown by his treatment of Cardinal Balue, whom he caused to be imprisoned for eleven years in iron cages so small that he could neither stand up nor lay down in them. Louis had many of these cages in his various castles, and he did not

disdain to be their constructor, he having, under his own eye, no less than three forges in his Chateau of Plessis for their fabrication, which work, and witnessing fights between cats and rats, constituted his only pastimes. At last this so-called "most Christian King," with no familiar save Tristan, his chief hangman, devoured by fear and ennui, and drinking the blood of young children to restore his strength, felt the end of his crafty and vindictive career approaching. In sight of the avenue of gibbets leading to his castle, his "reign of terror" terminated August 31, 1483, he dying utterly detested, unhonored and unmourned. However, it must be said to the credit of this monster of cruelty that to his superior mind was greatly due the overthrow of the feudal aristocracy, the formation of a stable government, and the union of the entire French nation.

Plessis was the place of reconciliation of Charles VIII. with the Duke of Orleans, afterward Louis XII.; in 1506, here was held the convocation of the States General which annulled the engagement of Claude of France with the future Emperor of Germany, Charles V., and affianced her to Francis of Valois, thereby changing the destiny of nations; and here took place the reconciliation of Henry III. with the King of Navarre, which ended the civil war.

This famous chateau, in 1778, became a poorhouse; was sold and partially demolished during the revolution of 1789; and of the ruins of this sombre and terrible abode of of Louis XI., once hedged around with every defensive device, now only a few fragments remain to tell that here lived a tyrant "whose sole name blisters our tongues."

Descending the Loire, the landscape, seen from the summit of the right bank levée, is ravishing. Balzac, with the pencil of an artist, has described this panorama of spark-

ling waters, green isles, rocky hills, white cottages, fertile fields, rich vineyards, fruitful orchards, flowering gardens and far-off forests.

From an opening of a valley on the north, backed by lime cliffs pierced with cave dwellings, is seen upon their summit the Castle of Luynes and its bold flanking towers. The primitive chateau probably had succeeded to a Roman camp, and at length became the residence of the Seigneurs of Luynes. Not far off are the ruins of a Roman aqueduct, of which eight arches and fifty piers remain.

Passing by the Church of Savonniers, from which are exquisite views of the Cher and Loire, and of the unartistic but beautifully located Chateau of Villandry, we come to the railroad bridge spanning, with its nineteen arches, the broad Loire. Nearly opposite is "*La Pile de Saint-Mars*," a strange, square brick tower, almost a hundred feet high, which is an enigma to archæologists. Some consider it a memorial of the conquest of the country by Cæsar; and others see in it a monument to Quintus Marcus, a Roman officer who died on the expedition. The name of "Cinq-Mars" may be a corruption of the latter name, or be derived from "*quinque Martis*"—five sons of Mars who fell here.

Near-by are the two dismantled round-towers and the gateway between of the old Chateau of Saint-Mars, which gave a title to the handsome, shallow and ambitious favorite of Louis XIII., who dropped the patronymic of "Cinq-Mars," and was known at Court as "Monsieur le Grand," one of the most noted personages of France. Young and thoughtless, confident of favor, arrogant in power, this spoiled and scented darling of the court made many enemies of those envious of his good fortune, especially of the

implacable Richelieu, who feared him, but whose crafty cunning soon found the means of bringing this upstart to the scaffold, and subsequently of destroying his castle, save its gate-towers which yet remain to point out the once gay abode of the dashing though weak Grand Seneschal of France.

After passing villages of caves cut in the yellow chalk bluffs, we reach Langeais, where the Romans doubtless established a camp, upon the site of which a castle was built towards the end of the tenth century. This strategic position continued to be occupied and later became an important stronghold of the province. The present picturesque chateau was built about the middle of the thirteenth century, and was given by Louis XI. to the Count of Dunois and Longueville, son of the celebrated bastard of Orleans. After its completion, the marriage of Charles VIII. with Anne of Brittany took place (1491), an event which united that important province to France. With trifling exceptions, this chateau was skilfully restored by M. Baron, and now, with its high crenelated walls, imposing towers, boldly projecting machicoulis and military architecture, presents, despite its ugly chimneys, a striking effect. The apartments are well furnished, contain many works of art, and the terrace commands fine views over the valley of the Loire.

About seven miles south of Langeais, upon an island in the Indre, is the small Chateau of Azay-le-Rideau, an exquisite gem of the architecture of the reign of Francis I., floating like a halcyon nest amid reeds and water-lilies, and reposing in security almost buried in luxuriant foliage. Less original in plan than Chenonceau, less striking in *ensemble* than Chambord, and less imposing in situation

than Amboise, it is of a purer type than any of those of the early sixteenth century French Renaissance. It is two stories in height, with a lower wing. The principle façade is terminated below the eaves by a kind of projecting entablature resembling a machicoulis gallery; its embellished high dormers, and sculptured chimneys decorate the roof; and bold round towers, supported by heavy brackets, grace the angles of the edifice. The dignity and delicacy of its outlines, and breadth of its design; the elevation of its roofs and their vertical appendages; and the finish and taste of all its details—constitute a charming aggregation. Over the chief portal, enriched with sculpture and combinations of three classic orders, is the salamander of Francis I., with the motto "*Nutrio et extinguo.*" All the parts of its splendid portico are crowned with arabesques, in which the sculptor seems to have exhausted all the delicacy of his chisel and the fantasies of his imagination.

Returning to Longeais and descending the Loire, we rapidly pass the Chateau of Planchoury; St. Michel, perched on a height; the new Church of St. Patrice; and the Chateau of Rochecotta, in which was born the Chouan leaders of that name. From a summit near the latter we enjoy a splendid panorama. The eye takes in much of the valley of the Loire, and follows the course of the great river sprinkled with verdant isles; and in front we look up the glassy Indre to the towers of Azay-le-Rideau, its northern bank covered with vineyards and fertile fields and the southern one by the sombre masses of the forest of Chinon, above which tower the roofs and spires of distant villages, thus producing a striking picture of the blended beauties of nature and art.

Lower down, upon a wooded plateau, rises, among many

silver streamlets, the imposing Chateau of Ussé, which belonged to the younger brother of the Vendean hero—Roche-Jaquelein. This sumptuous dwelling was partly rebuilt early in the sixteenth century, more in the heavy Gothic than in the light Renaissance style. Its two massive groups of ponderous towers enclosing an interior court, with its pavilions, turrets and machicoulis galleries, give it rather the aspect of a baronial castle than of a modern habitation. The illustrious Vauban, the great military engineer of Louis XIV., was here often upon a visit to his eldest daughter, who married into the family owning the chateau, which probably will account, in some manner, for its fortress style.

Passing by many thriving villages in the broad productive valley of the Loire, we reach the Chateau des Réaux, formerly named Plessis-Rideau, a charming little castle with prominent towers, graceful elevated roofs, and walls checkered alternately with blocks of red brick and white stone. It was sold, in 1650, to Gédéon Tallemant des Réaux, the well-known publisher of novels, from whom it takes its name.

At Cande, opposite the mouth of the Vienne and where Touraine terminates, stands the grand and sacred basilica of St. Martin covering the spot where the venerable prelate died. From here, ascending the fertile valley of this great tributary of the Loire, we see on every side a glorious panoramá of hills, hamlets, meadows, vineyards, walnut groves, forests and rocks, and on every height windmills, elegant villas, or historic chateaux. Among the latter, towards the South, is that of Coudray-Montpensier, with its high-peaked towers and bold machicolis defences. It has

had numerous owners, and, in 1545, was presented by Francis I. to his Grand Master of the Wardrobe. Near here, in the commune of Seuilly, Rabelais was born, in 1843, and in a neighboring abbey received his early education from the monks whom he afterwards mercilessly satirized.

About ten miles up the Vienne we reach the extensive ruins of Chinon, occupying the summit of a rocky plateau, rising abruptly above the town and river. As we look upon its great donjon, its dismantled walls, its crumbling towers, and its vineclad curtains, reflected in the Vienne and outlined upon the sky, the mind is oppressed with the silence of its centuries of history and its dread desolation amid such a smiling landscape, now radiant with prosperity and busy life.

Steep cliffs or vertical walls on three sides, and on the fourth a deep cut through the promontory upon the extremity of which the castle is built, prevented the possibility of its escalade, while deep broad ditches separate its three enceintes. The interior one, or citadel, still retains its postern gateway, flanked by a tower, called the *Tour de l' Horloge*, which is over seventy feet high. In the only part now inhabited are shown the royal apartments, in one of which Joan of Arc had her interview with the apathetic Charles VII., who, though plainly clad, she singled out as by instinct, from the crowd of magnificently attired courtiers.

The Castle of Chinon was founded before the establishment of the French monarchy. The Visigoths possessed it till the defeat of Alaric, when it fell into the hands of Clovis. After belonging to the crown for three centuries, Thibaut le Tricheur became its master, and by him it was much

enlarged. The Counts of Blois possessed it from 914 to 1044, when it passed to the Counts of Anjou, who, in virtue of their title, kept it till 1151, and as kings of England, till 1205, when Philip Augustus captured it after a valiant defence by Lasey, a brave knight who had accompanied Richard Cœur de Leon to the Holy Land. Chinon, again united to the crown, became an appanage of the queens and princes of the blood, and was alienated in 1631 by a subterfuge of Richelieu, who, as Prime Minister, sold it to be himself the purchaser. His family allowed this celebrated and venerable castle to go to ruin; but the great events of its history cannot perish. Here died two English kings—Henry II. and Richard Cœur de Leon; here lived ten kings of France—Philip Augustus, St. Louis, Charles VII., Louis XI., Charles VIII., Louis XII., Henry II., Henry IV., &c. Among its governors was Philippe de Comines, the historian; and in the number of its prisoners were the wife of Robert, Count of Artois, Geoffroy le Barbu (delivered by Pope Urban II.), Jacques de Molay, Grand Master of the Templars, with five great dignitaries of the order, 150 Jews, accused of poisoning the wells, and 389 Vendeans, who, the morning after their confinement, were slaughtered to appease the vengeance of the revolutionary vigilance committee of 1793.

> "Beneath these battlements, within those walls
> Power dwelt amidst her passions; in proud state
> Each robber chief upheld his armed halls,
> Doing his evil will, nor less elate
> Than mightier heroes of a longer date."

South of Chinon once stood the magnificent Chateau of Champigny, a *chef-d'œuvre* of French renaissance, filled

with works of art; but all, save the chapel with its exquisite stained glass windows, were destroyed by order of Richelieu.

Still further south, the great Cardinal built, in the now dead city of Richelieu, another stupendous pile. It rose as by enchantment, and was filled with every thing which money and power could command; but its marbles, its paintings, and precious things have all perished or are scattered throughout the realm. Of that vast chateau, the wonder of the age, naught remains save a few insignificant fragments, and its sole dwellers are the howling winds sweeping o'er its desolation, the mousing owl hooting in the rents of ruin, and noisome reptiles crawling among the rank weeds choking its spacious courts. Silence and decay now mark the birthplace of the proud, arrogant and unprincipled statesman whose life was devoted to his own aggrandisement and what he called "the Glory of France"; but it was a mean and selfish glory, to attain which he waded through the noblest blood of the land, and then died a hypocrite, declaring that he had no enemies save those of the State. Yet this ruler of Louis XIII. and despot of France would not choose to have his epitaph written by the chivalrous Montmorenci, the poetic Chalais, the gallant Cinq-Mars, the witty St. Prieul, and, above all, by the wife of his sovereign, Anne of Austria, whom he tried to seduce and then to banish and utterly ruin.

Returning to the Loire we are soon near Saumur, once the stronghold of Protestantism, where is still seen, beneath the cupola of the Church of Notre Dame d'Ardilliers an inscription by Louis XIV. celebrating the suppression of heresy throughout his dominions, and the

extirpation of its followers—a subject rather of shame than of boast, on a spot which suffered in turn the Massacre of St. Bartholomew, the atrocities of the Dragonnades, and finally ruin from the revocation of the Edict of Nantes.

Saumur is a small, cheerful and bright city. Seen from the river it is very picturesque, with, in the foreground, the Hotel de Ville, a quaint building with peaked roof and turreted angles; and, behind, the city spires and towers, and the overhanging fine old castle and its tall donjon. The town is the seat of the great cavalry-school of the French army, and carries on much trade in agricultural produce. In 1793, the brave Vendean army, led by the dashing Roche-Jacquelein, compelled its surrender and of 11,000 republicans, who were treated with a humanity strikingly in contrast with their own atrocious system of relentless massacre.

The vicinity of Saumur abounds in antiquities. The Cromlech of Bagneux, within a mile of the town, is the finest in all Anjou, being a chamber 64 feet long, made up of enormous stones, the largest of which is 24x21x2¾ feet. Some twelve miles further to the southeast are several others; but, far more famous than these are the remains of a magnificent abbey at Fontevault, the burial-place of Henry II. and Richard Cœur de Leon of England, but now used as a house of correction.

Below Saumer are the villages of Trèves, Cunault, Gennes, La Ménitré, and St. Maur, which are remarkable for their ruins of ecclesiastic and other old structures; Les Ponts-de-Cé, on an island, strategically important because of the easy passage here of the Loire; and La Pointe,

where the Maine, flowing from the north, adds its great volume to the waters of the Loire.

Black Angers, familiar to the readers of Shakespeare's King John—the cradle of the early Plantagenet monarchs, is five miles above the mouth of the Maine. Around the old city, in the midst of which is a magnificent cathedral, are now broad boulevards where once stood "the saucy walls" with "strong-barred gates," "that as a waist did girdle it about," when Philip of France threatened "those sleeping stones" with his "drift of bullets," and John of England made ready with cannon, "full of wrath, to spit forth their iron indignation." Its most venerable relic is its old castle, built by Louis IX. on the summit of a bold rock, which, notwithstanding the mutilations of Henry III. in 1535, is yet, perhaps, with its seventeen colossal towers, eighty feet high, the finest feudal castle in France. Angers has also its school of art industry, scientific societies, museums and colleges. In one of these latter were partly educated the Earl of Chatham and the Duke of Wellington. Angers has considerable commerce, and its foundries and sail-cloth manufactories are flourishing industries. Beyond the city stretch out in every direction fine suburbs, rich vineyards, gardens and nurseries, besides slate-quarries adding great wealth to this region.

Again descending the Loire, we pass Chalonnes and its coal mines; the village of Champtoceaux, where Marshal Gilles de Retz, the legendary bluebeard, had his castle; the picturesque little town of St. Florent-le-Viel, with David's mausoleum of the Vendean hero, Bonchamps, mortally wounded at Chollet; Ancenis, where a fine sus-

pension bridge spans the Loire, and the remains of a castle of the Dukes of Béthune; Oudon, a tall, black, octagonal tower of the thirteenth century; and many other towns, hamlets and castellated ruins.

We have now reached the Lower Loire, with La Vendée on the south, and on the north the Department of Loire-Inferieure, which historically and geologically belongs to Britanny, though its commercial interests have alienated its peasantry from that province, and they no longer use the Breton language. Of La Vendée we will speak more at length after we have traversed the Loire.

We have, in our descent, reached tidewater, but the maritime estuary can be said to begin only about nine miles below Nantes, where the great river, swollen by the Eudre and Sèvre, give it a width of from one to three miles, though much obstructed by ever-shifting sand-bars and numerous islands.

Nantes, forty miles from the ocean, with a population of about 120,000, is the fourth seaport of France, and one of its handsomest cities. It takes its name from Namnetes, a Gallic tribe, and hence it antedates the Roman conquest. It boasts of its beautiful public park; its fine gothic cathedral; a modern palatial edifice containing the library, museum and art collections of the town; its noble quays, lined with miles of handsome houses on one side, and fringed with shipping on the other; and its venerable castle, in which for a time most of the kings of France since Charles VIII. have lived, in which Henry IV. signed his famous edict of 1598 (revoked by Louis XIV. in 1685), and from which the celebrated Cardinal de Retz made his escape in 1654.

In former times Nantes supplied the French West Indies with slaves; but even a sadder history came to it during the French Revolution. Here took place those terrible "Noyades" and "Republican marriages," the invention of the monster, Carrier, who, thirsting for more blood than the guillotine could supply, devised these schemes of wholesale death. Barges, filled with human victims, were taken to the middle of the Loire, where their trap-door bottoms were opened to sink in death their helpless freights. Thus were consigned to eternity by exulting savages from six to nine thousand men, women and children whose only crime was an ardent love of country.

The Republican marriages, and other refinements of the cruelty of these biped blood-hounds, consisted in binding, back to back, a naked man and woman, and after an hour's honeymoon in the blistering sun, hurling them into the Loire. To these barbarous atrocities were added the "Fusillades," which took place day after day on the Plain of St. Mauve, where at one time five hundred young children were mowed down by musketry and their corpses thrown pell-mell into the ditches. It is estimated that 30,000 innocent beings were in 1793 slaughtered here and in its vicinity.

The Vendean wars has also left some sad souvenirs at Nantes, Cathelineau having been mortally wounded, June 29, 1793, in the assault of this place, and Charette, another Royalist leader, was shot in April, 1796. The regicide Fouché, Police Minister of Napoleon I., was born at Nantes.

The environs of this city display great marks of opulence and prosperity in its numerous pretty villas and its busy factories.

Descending the Loire from Nantes, we pass Indre and the Island of Indret, with an old castle and a large manufactory of marine engines, belonging to the Government; Couèrou and its lead works; Saveny, to the north, on a bluff commanding a magnificent view over the river's estuary, and noted as the place of the final defeat of the Vendean army under Roche-Jacquelein and Stofflet; Pambœuf, now nearly abandoned for most commercial purposes; and St. Nazaire, a town sprung up since 1856, around a Breton village at the mouth of the Loire, which now, by packet steamers, carries on a thriving trade with the West Indies and other parts of the world.

"*Quel torrent revolutionnaire que cette Loire!*" was the expression of the Jacobin Barrère. Both physically and historically the epithet is justified: physically, because of its unbridled impetuosity, tumbling o'er beetling crags and lava precipices in its upper volcanic valley, and of the desolating inundations, shifting shoals and treacherous quicksands of its lower course; and historically, because on its banks direful plots have been laid, venomed vengeance has been king, and grim-visaged war has never smoothed its wrinkled front from the era of the Roman conquest to the bloody days of the massacres in La Vendée.

"No mercy, no quarter, no prisoners," was the watchword of the Republican forces who marched against a peasantry of poachers and hunters, incited to resistance by their fanatical priests; and occupying a land of marshes and ponds, intersected by dykes and canals, of copses and jungles cut up by rivulets and ravines, and with a subsoil pierced and traversed in all directions, like a madrepore,

by secret passages of cells, mines and galleries. Hence, for the enemy, all communication was difficult, while the natives in these shady hollow-ways could move unseen, at every turn pick off stragglers, and concentrate in their forest labyrinths against the unwary foe. In their palasadoed fortresses of trees they were secure, from behind hedge-parapets they could deliver their deadly fire, and, if opportunity offered, they could sortie upon their assailants, and, if hard pressed, retreat in an instant to their hiding-places and there remain as silent as the spent avalanche. The invaders were made desperate, and soon every pathway was marked out with blood, the torch consumed every dwelling, and rapine and massacre stalked alike through hamlet and city. Then, suddenly, from every rank of life rose heroes like Cathelineau, Stofflet, Charette, d'Elbée, Bonchamps, Lescure and Roche-Jacquelein, who led these rural dwarfs, but giants in battle, for three years against the disciplined and victorious armies of France, until the youthful Hoche, with his two hundred thousand veterans, terminated this terrible tragedy of civil war, which had desolated the land and sacrificed hecatombs of brave men, loving mothers and innocent children.

WINTER GRAZING IN THE ROCKY MOUNTAINS.

BY

GENERAL BENJAMIN ALVORD, U. S. ARMY.

It is esteemed a proper subject for consideration and record in the American Geographical Society, that during the last fourteen years a revelation has dawned on the people of the United States, respecting the resources for winter grazing in the whole Rocky mountain region. It is now known that all land over about 3,000 feet above the level of the sea has those qualities, viz.: that, without shelter, all the domestic animals can find ample food on the nutritious, summer-cured grasses of those plateaus, and that myriads of those animals are yearly raised by the great capitalists and others in our western regions. The experiment has now for so many years been tried, that it is not considered at all problematical, and although winters of great severity may occur, it is admitted that on an average the losses in the herds by the vicissitudes of the weather do not exceed five per cent. of the whole number.

We will first enquire why this fact was so long concealed from the knowledge of the most enterprising and astute of our western inhabitants. We will afterwards explain the philosophy of the cured grasses, and the action of the climate in those high and arid regions; and give some account of the distribution of the various grasses, and set forth how far the peculiarity is one confined to North America, or if found on other continents.

Surely it is extraordinary that so salient a fact as to the resources of this country should not have been fully

known until the completion of the Union Pacific Railroad in 1869. My army station from 1852 to 1865 was in Oregon or Washington Territory, and at Omaha from 1867 to 1871. Thus I was thrown in the course of my official travels into regions giving me opportunities for observation, which I embraced. But I must confess that notwithstanding my knowledge of the benefits of the cured bunch-grasses in Oregon east of the Cascade mountains, and my large intercourse with emigrants yearly arriving on the Pacific slope and with the officers and scientists of many exploring expeditions, it was not until during my residence in Omaha and my journeys over the Union Pacific Railroad, that I knew of the immense resources for winter grazing on the Rocky mountain plateaus, which cover probably one-fourth of our whole territory. Our total area is four million square miles, and we can safely add that the region for winter grazing is about a million of square miles, if not more—not including any portion of Alaska.

The moment California, New Mexico and the other territories were acquired from Mexico, in 1848, our Government turned its attention to the Pacific slope, and to the necessity of a Pacific Railroad; and sundry exploring expeditions were organized in 1853 to examine the various routes —northern, southern and central. These expeditions, and those preceding, of Lewis and Clarke, of Long, of Bonneville, and of Fremont, gave to the world a great mass of information of all kinds, concerning those little-known regions.

Each of the Pacific Railroad exploring parties had scientists of the highest repute in various branches of investigation, as geology, botany and natural history, and had with them experienced guides, hunters, woodsmen, mountain-

eers and prairie men; and all these were as ignorant as the rest of the winter resources of that vast domain! The reason was that all the explorations were made in summer each party returning to winter in lower altitudes in the settlements, without any attempt to discover and unveil the winter characteristics of the mountain regions.

We learned at Omaha that the discovery of the resources of the Rocky mountain plateaus for winter grazing was really made during the war, by the parties under that enterprising man, the late Edward Creighton (afterward President of the First National Bank of Omaha), who had taken the contract to build the telegraph line from Omaha to San Francisco. One winter their animals were left to graze in the elevated pastures of those regions, and were found in the spring in splendid order for the prosecution of their labors. This fact was utilized by Mr. Creighton, and it was the foundation of his large fortune, made in great part by stock-raising in Western Nebraska and Wyoming. These facts soon became known. His friends made no concealment of the important discovery. Indeed, it had almost been anticipated by the experience of many on the plains.* But by the time the Union Pacific Railroad was completed, in 1869, the enterprising capitalists and herdsmen of the West were aroused and ready to avail themselves of this new and promising mode of investment.

* From statements received from reliable sources, in reply to recent critical enquiries, we are satisfied that Mr. Creighton was the first to ascertain these facts in reference to long routes, and over such an extensive tract of country, and to induce faith in the resources of the whole Rocky mountain plateau. It seems that Seth Ward, a trader at Fort Laramie, and Mr. Bent, a trader at or near Fort Lyon, had made use in the vicinity of those places of such winter grazing, several years before the war. But their experience was local and unknown to the general public.

If it excites any surprise that so many enlightened army officers of varied experience, scientists, emigrants and explorers, who, since the discovery of gold in California in 1849, had traversed those regions, should have failed to make this discovery, let it be noted that those famous hunters and mountaineers, Daniel Boone, Nathan Boone, Kit Carson, the Choteaus, Mackenzies, and other fur traders, experts, guides and Leatherstockings of the frontier, had also been equally unconscious of the capabilities of a region in which they had spent their lives. Nor could they have gotten the facts from the Indians, who did not themselves know the immense resources of their country.

Neither that peerless, redoubtable hunter, Randolph B. Marcy, nor his senior and companion, Martin Scott (who had accompanied Long's expedition), were exceptions to this statement. They were as hardy, persevering and indomitable hunters as Daniel Boone. Of the latter it was said that in 1818, at the age of 83, he was pursuing the daily chase two hundred miles to the westward of the last abodes of civilized man. Now every summer Marcy, though he has for fifty years been hunting on our frontier, continues with gusto his excursions to the Rocky mountains. It cannot be said of him as of Boone:

> "'Tis true he shrank from men even of his nation;—
> When they built up unto his darling trees,
> He moved some hundred miles off for a station,
> Where there were fewer houses, and more ease."

But if Marcy returns to civilization to pass his winters, it is true that he revels in those regions, and he would say with Burns:

> "My heart's in the Highlands, my heart is not here,
> My heart's in the Highlands, a chasing the deer."

Once, in 1859, he employed his leisure in preparing a much-needed book, "The Prairie Traveller." It was a valuable work, creditable to his sagacity, giving much detailed information never before published for young officers and others preparing for expeditions on the prairies; but it did not make known their resources for winter grazing.

In 1868 a treaty was made with the Sioux Indians by officers and Indian agents to whom the trust was delegated. Generals Sherman, Terry and Augur, and Mr. Sanborn (an old Indian agent) of St. Paul, were among the commissioners. The treaty made "special provisions for individuals of the tribe who shall cease to roam and hunt and shall desire to commence farming." But no provision was made to reward, assist and stimulate them to stock-raising, although their country embraced the very choicest regions for winter grazing, and, says Gen. Terry, "the soil and climate are, on account of the frequent droughts, but illy adapted to agriculture."

It is much to the credit of General Terry, commanding the Department of Dakota, that so soon as he became fully apprised of the resources of the land of the Sioux, he incessantly urged the Government to make timely and efficient arrangements to induce those natives of the soil to make trial of pastoral life, that half-way status from barbarism to civilization.*

Habituated carefully to give shelter to our cherished domestic animals, the paradox did not easily dawn upon us that by going a few thousand feet higher on the arid plains

* We are enabled to place in the Appendix, marked A, an extract from a letter of General A. H. Terry of January 26th, 1877, to Senator Allison, then chairman of the Committee on Indian Affairs in the Senate.

in the "Great American Desert" (as it was termed), they, except sheep, could be fattened without cover and without the issue of a pound of forage. The country twenty years ago had such a large and unsettled domain, that we did not then need this information. The knowledge has come just when wanted to supply great and leading demands in our commerce, foreign and domestic.

We will now undertake to explain the anomaly that the grasses of the arid plateaus are ready at all seasons for grazing, whereas in winter in all these lower altitudes they are not. Heat and moisture will cause the grasses in autumn and in winter to rot. With us they decay and, unless cut in season, cured and made into hay, are lost to use.

In the arid Rocky mountain plateaus the grasses as they stand on the soil are cured in the sun during the summer, the action of heat retaining and concentrating in the stalks the sugar, gluten and other constituents of which they are composed.* This is true of the bunch grasses, the buffalo and grama and many similar grasses, which pervade those regions. It is so cold and so dry in those elevations that

* It is a well-known fact that the amount of nutritious and saccharine qualities in the grasses depends on the heat and dryness of the climate. This is tested by the experiment as to the comparative thriving of stock fed in open meadows and on woodland pastures. Such is admitted by practical farmers in the blue grass region of Kentucky. See page 257 of C. L. Flint, on "Grasses and Forage Plants," Boston, 1859. It is a valuable book, but appeared just before our knowledge of winter grazing in the Rocky mountains. His quotations from Blodget, Fremont and Marcy show how near they approached, without absolutely reaching that knowledge.

An attempt was made to cultivate some of the bunch grasses in Ohio, but they did not retain there (as was hoped) the wonderful nutritious qualities exhibited on the plains. The moisture of the climate is the cause, dissolving and diluting, as it were, their vegetable nutriment. The plant becomes changed when cultivated remote from its native arid habitat.

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there are neither heat nor moisture to rot them. And the snows are so fine (save in some exceptional seasons) in that cold atmosphere, that they are so blown by the winds into drifts, that four-fifths of the soil is never covered by them. Thus the grass is ever accessible to the domestic and other animals, while the snow is so fine that it falls from their backs; therefore they are not encumbered with a coating of frozen snow which in these lower regions would go far toward killing the poor brutes. They find shelter in the hollows, bushes and forests during very severe weather. In the natural abodes of the buffalo, antelope, and other wild animals, it is found that our valued domestic animals can in like manner survive the winter. Millions, countless millions of buffaloes have ever subsisted on the buffalo grass. Although our domestic animals generally prefer the other grasses, the buffalo grass does not fail to be one of their resources.

The difficulties in lower altitudes other than those I have described, have been that after a warm spell and a thaw, the snow freezes to a crust, and the grass is matted down by the ice and kept from the stock. East of the Cascade mountains in the arid portion of Oregon, bunch grasses and cured grasses are found near the Dalles, where it is only three or four hundred feet above the sea. In December, 1852, I witnessed such a thaw followed by freezing, which kept the oxen (left there to winter by emigrants bound to the Willamette) from getting to the grasses, and consequently large numbers died of starvation. If they had been wintered near Fort Boise, or anywhere 3,000 feet above the sea, they would have thrived on the rich bunch grasses ever accessible on those plains. Sheep

should always have shelter from the cold winds, but no other stock requires it.

The summer cured grasses are perennials, and in the spring the green fresh shoots push off the old colm or stem, sometimes seen in the new start of growth.

In Texas the grazing grounds are mostly at so low a level above the sea that the grasses rot in winter. Hence, in the latter part of winter, the animals there are often poor, and it is difficult to provide food for them. Thus it is that the vast herds started from Texas to be driven to market acquire flesh and improve every hundred miles of their journey north, as they reach new and well advanced pastures.

This accounts for the apparent anomaly that the cattle in New Mexico, Colorado and Wyoming are in those seasons in so much better condition than the herds in Texas, San Antonio being only 600 feet above the sea, Fort McKavett 2,060, Fort Clark 1,000, the higher plateaus not being reached till we approach El Paso. Thus Texas, long esteemed the choicest region for raising cattle in this country, the very paradise for them, has, for over three-fourths of its area, the important drawback of the decay of its grasses late in the winter, which renders it difficult to subsist their immense herds, as I have heard capitalists from San Antonio deeply lament.

But we must now allude to another element which prepares that elevated region for winter grazing, viz.: that the climate is much warmer than in the regions east of it in the same latitude. The isothermal lines all ascend in moving westward.

At Mount Washington in New Hampshire, 6,300 feet above the sea, it is difficult for the Signal Service soldiers

to get through the winter, such is its severity. Whereas at our military posts in the mountain plateaus, six to ten thousand feet above the sea, officers and soldiers have enjoyed great comfort during the twenty or thirty winters they have been occupied by troops. Witness, Fort Sanders, Fort Steele, Wyoming Territory, about 7,000 feet; Fort Bridger, 6,780; Fort Fetterman, 8,500; Fort Garland, 9,000 feet above the ocean. We have witnessed the aggregation of miners at Leadville, nearly 10,000 feet above the sea, with a population of near 20,000, a city as large and as high as Quito in South America.

To comprehend the difference in climate between that Rocky mountain region and the Atlantic States, just imagine a mountain peak in the latter eight or nine thousand feet above the ocean, and the sure impossibility of man or animals living at such an elevation in the winter season!

I had occasion when at Omaha for several years to contrast the winter climate there and at Fort Laramie, Wyoming Territory, which is 3,500 feet higher. The latter is notoriously milder, and more endurable, being fully attested by the records of averages of temperature for thirty years.

At Omaha cattle and horses must have shelter in winter, but none is needed at Fort Laramie. The extreme severity at Fort Buford, Dakota, 1,900 feet above the sea, is, in like manner, contrasted with the weather at Fort Phil. Kearny, on Powder river, 6,000 feet above the sea, or with the winter climate of Forts Custer and Keogh.*

* A very thorough digest of the statistics of the climate, including temperature, humidity, prevailing winds and their velocity, the number of cloudy days, &c., appears in "Science" for October 5th, 1883, by Dr. S. A. Fisk, of Denver, Colorado. He thus explains fully why that region has a climate promoting good health, and invigorating to many invalids. He says: "We have

Scientists are not yet able to assign satisfactory reasons for these anomalies—perhaps they are inscrutable. Why in ascending the slopes of the Rocky mountain plateaus a warmer winter climate should be encountered is a proper field for future consideration and investigation. It still remains a paradox. The reduced relative humidity is not a sufficient reason. That the currents of wind are made warmer by passing over arid plains would hold good in summer rather than in winter. In winter these currents often pass over snow-clad mountains, and when our cold weather east of the Mississippi is referred to northwest winds coming from those regions, how can we attribute to the same winds the unexpectedly mild winters of many parts of Montana and Wyoming. It would not be surprising if the true cause should be found in internal heat. Abundant traces of past volcanic action are found throughout the whole Rocky mountain region from the 49th parallel to Arizona.

The mild winter climate of California and Oregon can be readily traced to prevailing southerly winds in that season,

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seen, that so far as conditions of sunshine, humidity and rain and snow fall are concerned, the invalid can lead an out-of-door life a greater percentage of the time in Colorado" (and the same holds good of a large share of the whole Rocky mountain slope) "than anywhere else in this country. An experience of several years warrants the writer in asserting that an invalid can with perfect comfort and safety, spend several hours in the saddle, nearly every day of the three hundred and sixty-five.'

The inference is irresistible that a climate thus promotive of vigor, health and energy in the human race, would for like reasons conduce to the growth and well-being of all the domestic animals.

In the "History of the American Bison," by J. A. Allen (a very exhaustive monograph), in reference to the emigration westward in the southern range of the buffaloes, as winter appoached, from the region in western Kansas, he accounts for it by "*the greater mildness of the winters to the westward.*" (Report of U. S. Geological Survey, 1877, p. 466.)

but such conditions do not prevail in the regions farther east. These remarks offer a topic well worthy the future investigation of the scientific world.

We can make the following statement as to the region higher than 3,000 feet above the sea, fit for winter grazing. It includes all, nearly up to the timber line, of Montana, Idaho, Wyoming, Utah, Nevada, Colorado and New Mexico, and five-sixths of Arizona, one-half of Dakota, one-third of Nebraska, one-fifth of Kansas, one-fourth of Texas, and one-sixth of each, California, Oregon and Washington Territory. This embraces, as we have already said, about one-fourth of the area of the whole United States.

By the courtesy of Gen. F. A. Walker, superintendent of the last census, I have received a statement of the "Estimated number of ranches and range stock not taken by enumerators on farms." Therefore this gives the number of animals in each State and Territory in 1880 which subsisted by grazing in the manner we have described, including some in Texas and the Indian country not on the high plateaus. The full table will be given in Appendix B. But we will here state that it makes the total of cattle near four millions, and the total of sheep seven millions—a very low estimate. It contains no statement of the number of horses and mules.

Strange enough, all the best authorities who have had opportunities for comparison say that those regions farthest north are best. Brisbin, page 90,* says: "Montana has

*This is from Colonel J. S. Brisbin's book rejoicing in the tempting title "The Beef Bonanza," Lippincott, 1881. It contains a mass of statistics put together without method, but containing such as are difficult to be found elsewhere.

undoubtedly the best grazing grounds in America, and parts of Dakota stand next."

Generally the animals graze, summer and winter, in the same region. Sometimes, but rarely, they are driven in winter to lower levels. A friend, who accompanied Captain Dutton's exploration of the Grand Cañon of the Colorado in the summer of 1881, informs me that he met the owner of large herds whose grazing grounds were on that large high tract in Northern Arizona (36½ N. latitude) called "Kaibabs plateau," near 10,000 feet above the sea. Though it was his custom to drive the herds to a lower level in winter, yet in the previous winter it so happened that a large number of animals remained there the whole season and were in the Spring in fine condition. It certainly is wonderful that they could thrive at such an elevation. It was doubtless because in storms they were able to find shelter and food in the hollows and cañons, where, besides the cured grasses, there are many edible bushes, chapparal and undergrowth pervading the pine and juniper forests of that remarkable plateau, giving the animals very acceptable browsing.

When Sir George Simpson, President of the Hudson's Bay Company, published his travels "Around the World," and on the Pacific Coast in 1841, he evidently wished England to acquire California, and even predicted that as the United States could send few settlers by sea, they could not people Oregon with emigrants passing over the dreary intervening desert regions west of the Mississippi.

Images of prosperity in those fertile prairie lands (termed by Bryant "the unshorn fields boundless and beautiful") in the valleys of the Mississippi and its tributaries have for a century excited the desire of myriads, in our own and

foreign lands, to seek our Western country with a view to get agricultural homes. Twenty years ago any flattering use of the arid regions and the mountains would have been derided, for it was supposed that only in summer could their grazing facilities become available.

But it is pleasant that now such gleams of satisfaction can arise when we reflect on the important objects to which they are devoted.

Pastoral life from the earliest times has always excited the imagination of the poets. When we glance at the whole wide region referred to, continental in size, reaching the whole extent of our domain from north to south, and fancy we see, at one elevated bird's-eye view, the vast fields now inhabited, summer and winter, by innumerable herds, almost crowning the summits of the mountains, we exclaim: What would Virgil have written if his vision had been filled with such a prospect? His "Bucolics" would then have had a topic, if not more beautiful and idyllic than the rich fields and verdant meadows of Italy, yet far more grand and inspiring.

But it is not the insight of the poets we would now consider so much as that of the scientists, and whilst I have been reperusing the charming pages of Humboldt in his "Cosmos," dwelling on the "Aspects of Nature," in the plateaus of Central Asia (in vain searching to see if he described similar characteristics in that region), I have been led to reflect how a mental survey, such as I have just described, would have gratified him, and what abundant material it would have afforded for one of his glowing and eloquent paragraphs on the resources of North America. He watched keenly all the explorations of our Pacific Rail-

road parties, and read with avidity and approbation* all the valuable reports and annotations of their observations.

If it is desirable to give to this pastoral glimpse at the present uses of those plateaus forming the immense backbone of this continent, the benefit of a vivid contrast with their former history; if we wished to find not a pastoral but an epic picture for the background, we might recur to it as once the chosen abode of wild animals, grizzlies, elk, deer, antelopes, besides innumerable herds of bisons and tribes of Indians, skillful hunters of powerful physique, deeply imbued with the warlike and heroic traits of those races, whose achievements doubtless furnished ample material for many a barbaric Iliad.†

This brings me to refer to the timeliness of the discovery of the winter grazing in the Rocky mountains, as those Indians are now subdued, and are likely to give little trouble hereafter to the shepherds and herders.

If the gold in California had been discovered a few years earlier it would have been comparatively lost to the United States, as it would have been under Mexican rule. The capacity of California for wheat production became well known just when a large proportion of its people of enterprise, bone and muscle, tired of mining and roving, were glad to settle down to agricultural life. And this knowledge of winter grazing in our vast domain came when our

* See Humboldt's letter to Major A. W. Whipple, printed in one of the volumes of his explorations of a central route. Humboldt did not die until 1859.

† This is no fiction. The aboriginal tribes have their epics and Iliads, the records of boasted warlike deeds, in the shape of pictures and hieroglyphics, carefully painted on a buffalo skin (with ornamental border), setting forth their triumphs in war, whether with a neighboring tribe or with the whites. Curious examples of this habit have been seen by the writer on the frontier in our day.

agricultural settlements in their westward progress had touched those regions, when the railroads had made them accessible, when the Indians will permit us to use them unmolested, and when the want of meat in the whole civilized world has demanded that all such resources should be utilized.

In presenting to this society this subject, I have been desirous of stating to what extent the other continents in their higher plateaus have the same characteristics. Finding, as I have hinted above, nothing whatever in Humboldt's admirable chapters in "Cosmos," on the plateaus of Asia, I began to examine other authorities. First, I will quote a few sentences from a note to me of Dec. 16th, 1882, by Prof. A. Guyot, the distinguished Professor of Physical Geography, &c., in Princeton College. In reply to my queries, he says: "I have carefully searched the two large works on Geographical Botany, which are in my library, viz.: A. Delandolle's 'Geographie Botanique raissonnée,' and Lecoq's 'Etudes de Geographie Botanique,' to find something relating to the questions contained in your letter, but without success. The last work devotes nearly 200 pages to the graminées, but does not mention the cured grasses. As this quality of grasses depends, as I believe, upon climatic conditions, which prevent the destruction of their nutritious power by fermentation, it seems to me that the dry portions of the Andes and of the plateaus of Brazil should afford cured grasses as we find them in California and the Rocky mountains."

This letter has naturally stimulated me to considerable laborious research in the best works upon the subject, and to some personal enquiries of travellers. Indeed, it has absorbed more of my time in preparing to write this paper than any other topic.

In reference to Asia I have examined two works of Col. Prejevalsky of the Russian army, an adventurous and indefatigable traveller in the last eight years in the "Tangut country and Northern Thibet"; the work of Frederick von Hellwold on "The Russians in Central Asia"; Sir Joseph D. Hooker's "Himalayan Journals"; and the address of Sir Richard Temple, on the central plateau of Asia, at the British Association for the Advancement of Science, at Southampton, in August, 1882, to the section on Geography, of which he was chairman. Also, William Griffith's "Posthumous Papers bequeathed to the Honorable East India Company," containing "Itinerary Notes of Plants collected in the Bootan mountains, 1837–38," and "Botany of the Himalaya mountains," by J. F. Royle, M.D., Vol. 1, folio, London.

I find nothing in all these works about summer-cured grasses, although there are allusions to winter grazing. I think, from a conversation with Sir Richard Temple, since I read the above-named address, that in Thibet and Turkistan it is customary to drive the domestic animals in winter from high plateaus to lower. This doubtless referred to very high plateaus. For Huc, in his "Travels in Tartary and Thibet" (5th edition in French, Vol. 2, p. 224), speaking of the wild oxen of the Thibetan deserts, says: "During the summer they descend into the valleys to quench their thirst at the streams and lakes; but during the long season of winter they remain upon the heights and are contented with eating the snow and some herbs of extreme durability" (dureté.) * This is the opposite of the cus-

* I am indebted to Prof. Benj. Smith Lyman, of Northampton, Mass., for this extract from Huc. His geological explorations in India did not extend to those plateaus.

tom above referred to, and can be ascribed doubtless to the same conditions which we have described as existing in Texas. In its lower plains the grass would in winter decay, but if the cattle were driven to the arid regions of Northern Texas and New Mexico, nutritious cured grass would be found ready for the animals, as we have fully explained. Some of the descriptions of Western China or Chinese Tartary, by Richthopens, Vol. 1st, contain facts similar to those above quoted from Huc.

In Raphael Pumpelly's interesting work, "Across America and Asia," published in 1870, there are no direct allusions to the same conditions existing in Asia as in our Rocky Mountain plateaus. But he says, page 376, "The atmosphere of Central Asia is intensely dry, because the winds reach it from every direction only after having deposited their moisture on the broad belt of low lands and the high mountain peaks which intervene between the table lands and the oceans." Page 381 he says: "The sandy plains, which through the whole length occupy a width of 100 miles or more, form a dreary waste. But as we leave this going north or south we traverse the great grassy plains, which alone render the country habitable, and from which it gets its name—the land of grasses." In another place, page 369, he speaks of the plains as "covered in summer with a wavy mass of tall grass." From this we judge it unlike our various bunch and gamma grasses, which occur literally in bunches and do not form a turf.

In reply to a note from me, Mr. Pumpelly says, Feb. 2d, 1883: "I beg to say that, so far as my observation goes, the same conditions exist in Central Asia on the plateaus as on our western plains. The atmosphere is there (in

Asia) so dry that little snow falls anywhere on the plateau west of Manchuria, and, between the high winds and rapid evaporation at even a low temperature, the grass remains accessible to the herds of cattle, sheep, horses and camels."

As to the remarkably nutritious character of the grasses of some of the plateaus of Central Asia, we will quote the following from the address of Sir Richard Temple, above referred to: "The pastoral resources of that region have proved astonishing. For many years the Tartar emperors maintained in the field at least 500,000 cavalry, for which the horses were drawn chiefly from that plateau.

"The pasturage was so potent in nutritious qualities that ordinarily there was risk of animals suffering from repletion, and emaciated creatures gained flesh and strength."

I note that he names as abounding "the pointed grasses, sharp enough to pierce leather, &c."

It is remarkable in Central Asia what contrasts are exhibited. Prejevalsky descants on the inviting regions of Southern Siberia, though so much farther north, as contrasted with the fearful desert on his route in latitude 41°, commencing five degrees west of Pekin, thence to the Munniuta range.

Hooker says, speaking of the Himalaya mountains, "a flock of hornless sheep was seen grazing on short sedges and fescue grass in the middle of October, 18,000 feet above the sea."

Hellwold says, p. 82, &c., the country north of Kabul (which is in latitude 34° N.) is like the valleys of Cashmere. "Although the level plain of the valley lies 6,000 feet high, yet it is toward the west and the north, owing

to the shelter of the snowy range above, verdant with meadow land and luxuriant with gardens. Here the profusion of snow-white blossoms in spring and the rich abundance of fruit in summer and autumn, have from time immemorial been sung with ecstatic praise. Even the cattle are fed on grapes for three months in the year!"

The *Steppes* of Southwestern Russia, like the pampas of South America, are generally too low in altitude to have the characteristics of our Rocky mountain region. They are covered with snow in winter, which on occasion may melt and then freeze, and thus become very injurious to the domestic animals.

It therefore is evident that the whole question concerning Asia remains to be more fully illustrated by the observations of future travellers, and to make the desired comparison between the grasses and forage plants and winter grazing of its central plateaus and those of the United States.

In reference to South America, I have examined several works on that region and cannot find that those characteristics exist in the plateaus of that continent. I find nothing in the "Voyage of a Naturalist," 1840, by Charles Darwin, on the *Beagle*. If similar facts had existed they would surely have attracted the attention of that scientist, so celebrated for his close and keen observation. As already stated, the pampas of the Argentine Republic are generally too low to exhibit the qualities we refer to.

I examined with great care a very comprehensive work, sent from the Argentine Republic to the Centennial Exhibition in 1876, at Philadelphia, entitled "The Argentine Republic," by Richard Napp, Buenos Ayres, 1876. It says,

p. 106, "The high Cordilleras, although they do not always offer grazing grounds to the cattle, are, notwithstanding, a slight resource to them when otherwise they would die of hunger. Here and there between the Monte Formation and that of the Pura a green and magnificent belt of true alpine vegetation is found, which is rich in graminæ, refreshes the sight of the traveller who has just crossed those wastes, and it is also a resource for the droves of cattle."

At the instance of our minister to Brazil, Hon. Thomas O. Osborne, I consulted Mr. J. Parker Read. He wrote me, Dec. 28, 1882: "I have travelled quite extensively over South America, but have not made special notice of the subject referred to by you, but my observations have been to the effect that such part of the Pampas of the Argentine and the plateaus of Chili and Bolivia as are of value for grazing purposes are not subject to severe cold and snow storms as our west at all, the divisions of seasons being marked by cold and chilly rains only. In the spring the Argentine pampas are covered with a nutritious growth of tufty grasses, which dry and cure on the ground during the summer droughts, but like our prairie grasses are still nutritious. In the higher regions (plateaus of eight or twelve thousand feet) inhabited by the guanacos, Vicenna, Alpaca, &c., the snowstorms are, as you say dry, and drifting, and these animals are driven down in front of them to the lower plateaus for winter feeding when they are hunted—that is, on the snow border."

From personal inquiries of travellers who have been in the mountain regions of Peru and Bolivia, I infer that their

domestic animals subsist in winter very much on the bushes and chapparal found on the plateaus.

In reference to Africa I find even less on that topic than was accessible concerning South America.

I have examined that celebrated work, "Travels and Researches in South Africa by David Livingstone," and can find nothing germane to my enquiries. He extols a plateau (p. 582) in about latitude 17° S. and longitude 27° E., 5,000 feet above the sea, which "may be recommended as a sanitarium." It is in the Batoka mountains midway between the Atlantic and Indian oceans.

"This ridge has neither fountain nor marsh upon it, and east of the Kalomo we look upon treeless, undulating plains covered with short grass. The eastern ridge is not more than three hundred miles from the Indian ocean. That plateau merits inquiry for it affords a prospect to Europeans of situations superior in point of salubrity to any of those on the coast."

In the interesting paper on "Dutch South Africa" by Col. Aylward, published recently in one of the bulletins of this Society, nothing appears to indicate the existence there of a parallel to the climate of our plateaus. The two Republics of the Orange Free States and the Transvaal extend from 23° to 31° south latitude, and their plateaus are from six to eight thousand feet above the sea, and have fine grazing for cattle and sheep. But their rains are in the summer, whereas on our western plateaus they are in the spring.

The Cape of Good Hope is in about the latitude of 35° S., and thus the whole continent does not reach a climate similar to that of our northern central pasture lands, but might assimilate more to that of Mexico.

If thus little is known of the existence of similar characteristics of winter grazing on other continents, if they exist and are utilized, only travellers have not made them a topic, or if they exist and have not been known and used, it is well for us to bear in mind that our race, the universal Yankee nation, with its boasted activity and enterprise, was for near a century in contact with our central plateaus, but profoundly ignorant of their real capabilities.

I shall now give some account of the various grasses which are found on the plateaus, and which are summer cured. In Appendix C will be found a letter to me, of March 1st, 1883, from Dr. George Vasey, botanist of the Department of Agriculture, who has complied with my request to give me a concise statement of the names of the principal grasses.

In general parlance it has been supposed that what are called "bunch" grasses are in the northern portions of the Rocky mountain range, and that the "gama" or "grama" grasses were peculiar to the southern territories in New Mexico and Arizona. But I am satisfied from personal enquiries of travellers (Marcy and Dutton among others), as well as from the statements of the botanists, that both the "bunch" grasses and others are found in each region. But it seems probable that the "gama" and "grama" grasses are found in the greatest abundance in the more southern portion. The "buffalo" grass or grasses (for the term is applied to more than one kind) are found throughout all the ranges of the buffaloes from north to south.

The term "bunch" grass was given because it grows in tufts or bunches a foot or more in height, sometimes two feet apart, so that the aspect from surrounding hills would

often be that of a desert region. A green carpet is never or rarely seen. The buffalo grass grows as a low turf, and it is summer-cured, as it grows, like the other grasses under consideration.

By the courtesy of Gen. F. A. Walker, Superintendent of the Census, I had the privilege of reading (before publication) a full and interesting paper by William H. Brewer on "Pasture and Forage Plants." In the following statement I have often availed myself of some items from it.

The term "bunch grass" has been applied to several kinds, and we will name those prominently known.

The *Festuca Scabrella* is the one best known on the Pacific slope, ranging from California to Oregon and Idaho. The *Festuca Occidentalis* is also found there. The *Festuca Ovina* (or "sheep grass") in several varieties is found through the whole region of winter grazing, and seems the world over to be found wherever sheep graze. *Eriscoma Cuspidata* is one of the valuable bunch grasses generally prevalent.

Of the grasses termed "grama," *era-grostis poaevidis*, *era-grostis oxilepsis* are called grama grasses, the former in Texas sometimes called one of the buffalo grasses.

Munroa Squarrosa, Mr. Brewer says, is a buffalo grass of the north, and one of the grama grasses of Texas. *Calamagrostis longifolio* has a wide range and is sometimes termed "*mesquit*" and grama grass; and *Calamagrostis Canadensis*, sometimes called "blue-joint."

The terms "grama" and "gama" are not interchangeable. Brewer says that *Tripsacum Dactyloides* is the *gama* grass of the South—a tall coarse grass from three to seven feet high—and "is found from Texas to Illinois and Connecticut."

Though much confusion of names are in popular use in reference to all the grasses, it seems to be admitted that the term buffalo grass is applied most justly to *Buchloe Dactyloides*. It is one of the most nutritious of grasses and pervades the whole range of the Rocky mountain plateaus.

But the number of different grasses found in those regions is very numerous. so that the enumeration made by Prof. Vasey, or even the fuller statement of Mr. Brewer only name some of the principal grasses. The latter even says: "It is probable that more than a hundred and fifty species of grasses or allied plants form an appreciable element of the pasturage of the region under consideration. California is the only State of the region whose botany has been elaborated and published." * * * * "The list of Western forage grasses must therefore remain incomplete until the region is more thoroughly studied botanically."

Thus these papers can at least have one effect, to show that there is a promising field for more research, for elaborate treatises on the botany of that region.

One of the first enquiries of the political economist will be, How lasting will this resource of winter grazing be? Can these plateaus be thus utilized a half century hence? Doubtless the crowd of animals will soon be so great that these pastures will be bought and fenced in to a great extent. Even now such precautions are beginning to be taken. Still, for a long time the wide unsettled domain, especially the uplands, will be open to the public. The land bordering streams of water or at least ending on such streams, will be in demand.

This ownership will lead to experiments; such as are alluded to by Mr. N. S. Shaler in a recent number of "Science," or such as were set forth in a very thoughtful

paper on this subject by Elihu Hall, a botanist of Athens, Illinois, at page 225 of Horace Capron's Agricultural Report for 1870. It is yet to be decided whether some of the cured grasses now such favorities will be consumed, trampled out and exterminated by the myriads of cattle. In Oregon and California the farmers at once ploughed their pasture land and sowed grass of a kind better fitted for permanent cultivation and denser in growth than the native grasses. It remains for the great future to ascertain what grasses can be cultivated in the higher plateaus. Mr. Hall gives a list of some worthy of trial. It is well known that European grasses have been introduced in this country, and have covered whole States by their persistent powers of spreading, native grasses giving way before them.* Witness the Kentucky blue grass, east of the Rocky mountains, and in California the wild oats, which now pervade a large portion of the uplands of that interesting State. Also in that State the Chilian *Alpalpa*, a valuable forage plant, has been successfully introduced. The naturalist or agriculturist early in this century would not have dreamed in his wildest prognostics of the future, that so many valuable foreign vegetables, grasses and fruits, would eventually pervade the United States.

Thus there is every encouragement to hope that time, enterprise, experiment, and persevering culture may accomplish much to preserve and perpetuate the advantages now so characteristic of our interior plateaus.

* In an article by Robert Brown in the English "Geographical Magazine" 1874, "On human agency in the dispersion of plants," he says: "Thus a grass (*Stipa tertilis*) has invaded the Southern Russian steppes, and is rapidly displacing almost every other plant. Plants introduced into India since it was first visited by Europeans now range from Cape Comorin to the Himalayas."

This society must always be desirous of suggesting for travellers and scientists new fields of observation and investigation. Therefore, in conclusion, I will recapitulate the *desiderata* alluded to in this paper.

1st. How far do these characteristics extend to the plateaus of other continents?

2nd. Why is the climate of our interior plateaus so much milder than that of the regions in the same latitude east of them?

3rd. The best botanists aver that it remains for future explorers to make of that region a complete exhibit of their plants and their geographical distribution.

4th. Experiments and cultivation are needed to determine how these valuable capabilities can be perpetuated.

APPENDIX A.

The following is an extract from a letter of General A. H. Terry, of 26th January, 1877, to Senator Allison, Chairman of the Committee on Indian Affairs, U. S. Senate.

"It appears to me that most of the efforts to civilize Indians which are made by the Government are infected with a fatal error, the error of passing over, or rather attempting to pass over, one of the natural steps in the progress of civilization.

"Savage tribes, whose wants are supplied by the chase, never of their own accord suddenly abandon their nomadic habits and become cultivators of the soil. Uniformly they pass through an intermediate condition—the pastoral state. It cannot be supposed that the savage forefathers, even of those nations which are now the very flower of civilization, could have overleaped this necessary step. It is doubtless true that such a change in mode of life can be brought about more easily when a savage tribe comes in contact with, and under the control of a civilized people. In such case the savage has not to discover for himself the art of cultivating the earth; it is taught him; but savage habits remain; savage love of freedom to roam; savage impatience of constraint; savage hatred of persistent labor; and these are obstacles difficult to overcome;—they are almost insurmountable.

"Why the first step in the progress of civilization should be to the pastoral state is readily discovered. It is the step which is most easily made because it involves a comparatively slight change of habits. The new condition imposes but little constraint; it requires no constant labor.

"The Sioux treaty of 1868 fairly illustrates the course of thought which has controlled the Government in its efforts to civilize Indians; the results obtained by action under it show what may be obtained by such a policy.

"That treaty makes special provision for individuals of the tribe who shall cease to roam and hunt and shall '*desire to commence farming.*'

"The cultivation of the ground seems to have been considered the only alternative to 'roaming and hunting.'

"In effect, many of the Sioux who were parties to that treaty have ceased to roam and hunt; but very few of them have commenced farming. Gathered around the national almshouses called agencies, they are for the most part an idle, listless, worthless people, living simply to eat the food and wear the clothing provided for them by the Government.

"Even if it were easy under ordinary circumstances to convert an adult savage into a civilized farmer, it would be almost impossible to accomplish this in the country reserved for the Sioux by the treaty of 1868. There, in three years out of four, droughts or grasshoppers destroy whatever crops may be planted. There even a skilful husbandman would despair of obtaining a subsistence. Is it to be supposed that a savage can be made to appreciate the superior advantages of a farmer's life, where the cultivation of the ground consists almost exclusively of ploughing and planting—where a harvest is seldom known?

"Unless some change in the system of management be made these bands will be a heavy burden on the Government for many years to come."

APPENDIX B.

ESTIMATED NUMBER OF RANCH AND RANGE STOCK 1880, NOT TAKEN BY ENUMERATORS ON FARMS.

[*Prepared for Report of Census of* 1880, *and obtained from that Bureau.*]

	CATTLE.	RANK IN NO. OF SHEEP.	SHEEP.	SWINE.
Texas	810,093	3	1,240,000	499,252
Indian Territory	487,748	16	55,000	773,931
Colorado	444,653	5	345,000	3,229
Nebraska	354,697	17	48,000	377,178
Montana Territory	255,892	12	95,000	4,912
Wyoming Territory	243,140	6	310,000	352
Oregon	181,773	8	285,000	22,973
New Mexico Territory	181,235	1	1,850,000	10,302
California	150,737	2	1,575,000	264,869
Idaho Territory	106,290	13	90,000	7,449
Florida	91,025	15	49,000	28,549
Arizona Territory	90,774	4	390,000	4,630
Kansas	82,076	9	130,000	86,274
Dakota Territory	65,968	14	55,000	2,316
Washington Territory	63,630	11	96,000	1,246
Public Lands	58,450	....	....	....
Nevada	44,602	10	97,000	85
Utah Territory	37,239	7	290,000	3,423
Totals	3,750,022	....	7,000,000	2,090,970

APPENDIX C.

(*Letter from Dr. Geo. Vasey.*)

UNITED STATES DEPARTMENT OF AGRICULTURE,
DIVISION OF BOTANY,
WASHINGTON, March 1st, 1883.

GEN'L BENJ. ALVORD.

Dear Sir:

In reply to you request I offer the following remarks on the native grasses of the great plains and arid portions of the West. These grasses furnish the chief resource of the immense herds of buffaloes and the vast droves of domestic animals which feed upon the plains, and from the habit of growth are, for the most part, known under the name of bunch grasses. They are chiefly grasses of rigid aspect, at least as respects their culms and leaves, some of them, however, forming a diffuse and elegant panicle of flowers. The most important of the bunch grasses may be briefly mentioned as follows: Of the genus *Stipa* there are several species, *Stipa comata* and *S. setigera* occur abundantly in New Mexico, Texas, Arizona and the drier regions of California reaching to Oregon. In Colorado, Kansas and all the prairie region northward, stretching into British America, the *Stipa juncea* is the principal one of the genus. On the higher plateaus and near the mountains the *Stipa viridula* is very common, extending from Arizona to Oregon and British America. Somewhat related, botanically, is *Eriocoma cuspidata*, a very rigid

bunch grass with a fine, handsome panicle of flowers. It is equally widespread with the preceding.

Another widely diffused grass is *Aira caespitosa*, varying much in size and thriftiness according to the altitude and amount of moisture where it grows, but always having a light, elegant, spreading panicle of silvery-grey flowers. One of the most extensively diffused grasses is *Koleria cristata*, varying in height from one foot to two and a-half feet, with a narrow and closely flowered spike. Several species of Fescue grass (*Festuca*) are intermixed with the vegetation in varying proportions; the most important of these are probably the *Festuca ovina* in several varieties, and *Festuca scabrella*, the latter especially in California, Oregon and Washington.

The genus *Calamagrostis* furnishes several species which contribute largely to the vegetation of this region. They are mostly tall, stiff, and coarse grasses, but leafy, and some of them very nutritious. Of these *Calamagrostis sylvatica* and *C. stricta* are least valuable. Perhaps the best of them is *Calamagrostis Canadensis*, which is soft and leafy. Next perhaps in value is *C. Aleutica* of California and Oregon, extending into Alaska. *Calamagrostis longifolia*, confined chiefly to the plains east of the Rocky mountains, is tall and reed-like, growing in dense clumps from four to eight feet high. Several species of *Andropogon* are diffused from Arizona to British America on the plains, but are not found on the western coast. They are, however, not properly called bunch grasses, as their habit of growth is more spreading. The principal species are *Andropogon, scoparius, A. furcatus* and *A. nutans*. Some of them are known through the

plain region as Blue-joint or Blue-stem. Others more sparingly spread are several species of *Poa* and *Glyceria*. Several varieties of *Triticum repens* or couch grass occur abundantly in saline soils, and are among the most nutritious of grasses. *Brizopyrum spicatum* and species of *Vilfa* and *Sporobolus* also form extensive patches or salt meadows in saline soils. Besides these grasses already mentioned, there are a number of low growth and more diffused habit, which are known in the southwest and east of the Rocky mountains under the names of Mesquit and Buffalo grasses. The former belong mostly to the genus *Boutilona*, the most important species being *B. curtipendula* or tall Mesquit, and *Boutilona oligostachya* and *B. hirsuta* or low Mesquit. The true Buffalo grass is, botanically, *Buchloe dactyloides*, which in some places forms extensive fields of its low and densely tufted growth. Another similar grass, spreading out in low patches, is *Munroa squarrosa*. The above-mentioned species form the larger proportion of the grassy vegetation of the great plains.

Respectfully,

GEO. VASEY,
Botanist.

A JOURNEY THROUGH SOUTHEASTERN RUSSIA.

BY

GEORGE KENNAN.

It is becoming more and more difficult every year for the adventurous traveller and the enterprising student of geography to find a new field for exploration and study—or even a field about which anything new can be said. The blank spaces in the old maps of the world, which used to excite curiosity and stimulate the imagination with their inscription "unexplored," have one by one been filled up with prosaic topographical details; the civilized and semi-civilized parts of the globe from North Cape to the Cape of Good Hope, and from Alaska to the Strait of Magellan, have been overrun by an army of tourists, and described in a multitude of books; and even the "antres vast and deserts idle" of Asia and Africa, which served so long as hunting-grounds for the poetic imagination, have lost all their mystery, and their inhabitants the anthropophagi, instead of devouring the unwary traveller and leaving his bones to bleach on the sands as in the good old days, now recognize him as "Cookie," welcome him with mercenary smiles and take coupon meal-tickets for board. The world has grown small and familiar even since the beginning of the present century; and the traveller of these days, unless he is prepared to attempt the North Pole, or to plunge into the wildest and least accessible recesses of the great Asiatic mountain ranges, must be content to glean in fields where all the high geographical honors have already been reaped.

The country to which I invite your attention this even-

ing—Southeastern Russia—is one of these reaped fields, since it was explored and described, at least in part, as long ago as the days of Rubruquis and Marco Polo. It is less familiar, however, to Americans than any other part of Europe, and has never, I believe, as a whole, been made the subject of an address before this Society. It is not, perhaps, as attractive a region as one might select for the subject of a lecture, but it is a region that I know something about, and of parts of it it may be said, as De Custine once cynically said of Russia generally, "It is a country useful to every foreigner, because whoever has well examined that country will be content to live anywhere else."

European Russia, regarded from a topographical point of view, may be described as a vast nearly level plain bounded by mountains and inland seas. It is in many respects more nearly allied to Asia than it is to Europe. The great forest zone which stretches across it from the Northern Ooral to the Gulf of Bothnia, is simply a continuation of the forest zone which belts Siberia; the fertile or black earth region of Central Russia also has its counterpart in Siberia; and the very same treeless steppes which border the Black Sea and the Caspian extend eastward through Asia more than 1,000 miles to the base of the mighty mountains of the Altai and the T'yan Shan. Even the range of the Ooral, which is supposed to make a real physical line of demarkation between Russia in Europe and Russia in Asia, is a boundary in name rather than in fact. It can hardly be called a range of mountains in the popular sense of the words. It is simply a long, wide undulation, or series of undulations, like rounded earthquake waves, rising out of the steppes on one side, and sinking into steppes or flat forest land on the other. In most

places, a traveller unfamiliar with the geography of the country would ride from Europe into Asia, or from Asia into Europe, without ever suspecting that he had crossed a range of mountains.

I made my first personal acquaintance with Southeastern Russia at the famous old city of Neezhnee Novgorod, or Lower Newtown, a city picturesquely situated on a high bluff near the junction of the Volga with its tributary, the Oka, 250 miles east of Moscow. Every year, in August and September, there is held in, or rather near, Neezhnee Novgorod the largest commercial fair in the world, and for that reason it is an excellent place to study the life and people of Southeastern Russia. The fair is not held in the city proper, but constitutes a city of itself, standing on a low peninsula of land between the rivers Oka and Volga, about a mile from the old and permanent town.

Regarded from a commercial point of view, this city or fair ground of Neezhnee Novgorod is the most important place in all Russia. It is not a fair ground in the American sense of the words. Merchandise is not brought there for exhibition; it is brought there for sale. Neezhnee Novgorod is Russia's great market. Here the agents of the producers and the agents of the consumers—500,000 traders—meet every summer to exchange merchandise for money and money for merchandise, and their transactions foot up annually to more than $75,000,000. Hundreds of thousands of merchants of all classes and grades in Eastern Russia, Siberia and Central Asia get their whole annual supply of goods, directly or indirectly, through the Neezhnee Novgorod fair, and by its sales and purchases are regulated the prices of all the staple articles of trade throughout the empire.

The fair ground, if it may be so called, is a low, flat, but extensive tract of land lying between the rivers Oka and Volga, just above their junction, very much as New York city lies between East river and the Hudson. On this peninsula between the rivers stands a great city of shops, sheds and warehouses, regularly laid out in streets and squares, and covering perhaps 2,000 acres. Around the city, in a long, curving fringe, runs a perfect forest of masts, which, with the ceaseless whistling of steamers, testifies to the importance of the Neezhnee Novgorod fair and the vast extent of Russia's inland commerce. And along the flat, sandy shore of the rivers lies the merchandise which these vessels and steamers have brought. There are huge mounds of iron from the mountains of the Ooral; acres and acres of barrels containing dye-stuffs from Bokhara; long walls of cotton bales from Central Asia and the Caucasus; immense heaps of walrus teeth and mammoth tusks from Northeastern Siberia, and tens of thousands of boxes of tea sewed up in raw hides which have come overland from Pekin.

Back a hundred yards from the rivers begin the shops, and every street is devoted to a particular kind of merchandise. There is one street of pagoda-shaped buildings where nothing is sold except tea, another where they sell nothing but breadstuffs; and then there are the fur street, the iron street, the hide and tallow street, and dozens of others, every one of them appropriated to the sale of a particular kind of goods. But these are all wholesale stores. If you wish to buy a small quantity of anything you must go to the bazaar, which is situated near the point of the peninsula, and is crowded by almost all of the different types of humanity in Southeastern Russia. There

are Circassians selling silver daggers, belts and pistols from the Caucasus; Persians with soft, richly-colored rugs and carpets from Teheran; Chinaman with tea from Pekin, and handsome Armenians, with dark, dreamy-looking eyes, offering silks and shawls from the looms of Khokand. But don't suppose because the Armenian has soft, poetical eyes that there is anything else soft or poetical about him, or that you can get anything from him for less than it is worth. The Russians have a proverb which says, "It takes two Russians, three Jews and the devil to cheat one Armenian." Behind those dreamy eyes there is a keen, active brain, which reads you and your most secret thoughts like an open book.

All day long this bazaar and the narrow streets leading to it from the bridge across the Oka are thronged with swarthy Tartars in round skull-caps and long, loose Khalats; Russian peasants in greasy sheepskin coats and large basket-work shoes, with their legs swathed in dirty bandages of coarse cotton cloth and cross-gartered with hempen cords; disreputable-looking, long-haired, long-bearded monks, who solicit aid for hospitals, receiving contributions on a small board covered with black velvet, and transferring the money as fast as deposited there to big tin boxes hung around their necks and secured with enormous padlocks; brazen-throated peddlers selling kvas, mead, sherbet and other seductive and bright-colored drinks, together with black bread, cucumbers, long strings of dried mushrooms, brass jewelry, and large cotton handkerchiefs stamped with railroad maps of Russia; and finally, a surging crowd of nondescript traders from all parts of the Empire.

The number of beggars on the fair ground is beyond

computation; beggars for churches, beggars for mosques, beggars for hospitals, and beggars on private account. You would suppose that all the lame, halt and blind in the Empire were there to solicit charity. I saw, one day, an old haggard woman, apparently without legs, and with one distorted arm, and a hump-backed man, both dressed in rags, riding about in a rickety cart drawn by a lame, spavined horse, the woman singing, in a cracked voice, something that sounded like a dirge, while the man rang a bell to call public attention to their accumulated misfortunes. I think it was the most artistically-contrived exhibition of utter misery that I ever witnessed, and I could not help regarding it with a feeling of blended sympathy and admiration.

Nobody knows exactly how many people there are at any given time in the fair city; but the bakers report every day the amount of bread sold, and from this a rough estimate is made of the number of persons who eat it. It ranges from 75,000 to 150,000, exclusive of the inhabitants of the old and permanent city of Neezhnee Novgorod on the bluff.

The fair ends in the latter part of September. The merchandise, which has been brought there from the remotest corners of the Empire, is all carried away by new purchasers, and early in October, the fair city, with its shops, sheds, warehouses, churches, mosques, theatres and hotels, is entirely deserted, and remains without inhabitants until the following August, when the great tide of commerce again surges into it.

One of the first things which strikes the traveller on the threshold of Southeastern Russia, unless he be more familiar with that region than I was, is the *greatness* of it,

the extent of its resources, and the intense commercial activity manifested along its principal lines of communication. I had always thought of Southeastern Russia as a rather quiet, semi-pastoral, semi-agricultural region, which produced enough for the maintenance of its own half-civilized and not very numerous population, but which, in point of commercial activity, could never bear comparison for a moment, even with our most backward States. I was not a little astonished, therefore, at Neezhnee Novgorod to find the shipping of the Volga occupying fifteen miles of river front; to learn that for its regulation there was in the city a shipping court with special jurisdiction; that the "preestan"—or as a Western steamboat-man would say, the levee—was under the control of an officer especially appointed by the Minister of Interior Communications and aided by a large staff of subordinates; that the number of steamers plying on the Volga was about equal to the number plying on the Mississippi, and a third greater than the number on the Ohio; that $15,000,000 worth of merchandise came annually down a single tributary of the Volga, namely the Kama, a stream of which I had hardly heard; and that the navigation of the Volga, in times of prosperity, gave employment to more than six thousand vessels and nearly two hundred thousand boatmen. It may be that I ought to have known these things before, but I certainly did not, and they came upon me with the shock of a surprise.

I was also somewhat surprised at the heterogeneity of the population of the Volga basin. I had a vague impression that Russia in Europe, or at least this part of it, was inhabited exclusively by Russians; but before I had spent a week at the Neezhnee Novgorod fair, it became evident to me

that my impression was a mistaken one. In many parts of the Upper Volga basin the Russians do not constitute half of the population; and if a traveller were willing to take a circuitous route, it would not be difficult to go from Kazan, for instance, to the Caspian sea, without mingling with true Russians at all.

In the Volga basin alone there are more than five millions of people who, ethnologically considered, are not Russians, and do not belong to the Slav stock. Among them are eighteen hundred thousand people belonging to various Finnish tribes such as the Votyaks Cheremisses, Mordvins and Choovashes; six hundred thousand Bashkeers, a half nomadic tribe of Tartarized Finns living chiefly in the government of Oofa; two hundred thousand Keergees and Kalmiks from Central Asia, who invaded the lower Volga region in the seventeenth and eighteenth centuries; and between one and two million Tartars, or as the Russians pronounce the word, Tatárs, whose ancestors came into Russia with Chingis Khan and Tamerlane. None of these tribes have blended with the Russians to any considerable extent except the Finns.

There is a widely-current saying that "If you scratch a Russian you will find a Tartar," but, like most of the semi-proverbial statements about Russia, it is erroneous and misleading. The Slavs are no more Tartars than the Germans are. They had the misfortune to live nearer the Asiatic frontier than any other European people, and so had to take the brunt of all the great Turk and Mongol invasions; but they come from the same Aryan stock that we do, and if they are behind the rest of Europe in civilization it is not because they are half-savage Tartars or Asiatics, but because they stood between Europe and ruin

in the thirteenth and fourteenth centuries, and were beaten down and overwhelmed by the Tartar flood which the West European nations escaped. Any saying, therefore, which attributes to the Slav the character of the Tartar is not only misleading, but unjust and ungenerous.

Ethnologically speaking, it would be much more accurate to say, "If you scratch a Russian you will find a Finn." The Russians and the Tartars have blended very little by intermarriage, partly on account of race antipathy, and partly on account of the mutual intolerance and antagonism of Christianity and Mohammedanism. The Finns, however, who, when the Slavs entered Europe, occupied the whole of what is now Northern Russia, have to a great extent become Russianized, and the process of amalgamation is going on from year to year with increasing rapidity.

Generally speaking, the population of Southeastern Russia, from Neezhnee Novgorod to the Caucasus, is more heterogeneous than that of any other part of Europe; and in all discussions of the capacity of the inhabitants of Russia for representative self-government, this heterogeneity of the population, and the different stages of civilization which the various tribes of the Empire have reached, should be steadily borne in mind.

After making as thorough a study of the Neezhnee Novgorod fair as the time at my disposal would permit, I engaged passage in a steamer of the Kavkaz and Mercury Company for the lower Volga, and on Sunday, September 6th, went on board. It was a warm, clear autumn morning, and the dense fringe of shipping which extended far up and down the Volga was bright with varicolored flags and streamers. Bells were jangling from the fantastic towers

of the white and golden churches high up on the green bluff of the old town, and across the still water of the Oka came faintly the music of a regimental band playing in the fair ground park. The whole population of both cities—the old and the new—the Russian provincial capital on one side of the river, and the huge mercantile camp on the other—was in the streets enjoying the sunshine and the holiday, and the floating ponton bridges across the Oka were thronged by peasants in Sunday attire. Amid a chorus of shouts and good-byes in a dozen languages from the crowd at the landing, the steamer swung out into the current, and started on her voyage of 1,500 miles to the Caspian.

It has been said that Egypt is the creation of the Nile. In a different sense, but with equal truth, it may be said that Eastern Russia is the creation of the Volga. The ethnological composition of its population was mainly determined by that river; the whole history of the country has been intimately connected with it for more than a thousand years; the character and pursuits of all the East Russian tribes have been greatly modified by it, and upon it now depend directly or indirectly the welfare and prosperity of more than ten millions of people.

From any point of view the Volga must be regarded as one of the great rivers of the world. Its length from the Valdai hills to the Caspian sea is more than 2,300 miles; its width below Tsareetsin in time of high water exceeds thirty miles, so that a boatman in crossing it loses sight entirely of its low banks and is virtually at sea; it washes the borders of nine governments, or administrative divisions of the Empire; and on its banks stand thirty-nine cities and more than a thousand villages and settlements.

The most important part of the river commercially is that lying between Neezhnee Novgorod and the mouth of the Kama, where there ply during the season of navigation about four hundred and fifty steamers. As far down as the so-called Samara bend, the river presents everywhere a picture of busy life and activity, being full of steamers, barges and great hulks, like magnified canal-boats, loaded with goods from Eastern Russia, Siberia and Central Asia. The amount of merchandise produced even in the mere strip of country directly tributary to the Volga itself is enormous. Many of the agricultural villages, such as Leeskova, which the steamer swiftly passes between Neezhnee Novgorod and Samara, and which seem from a distance to be insignificant clusters of unpainted wooden houses, load with grain 700 vessels a year.

For the first 300 miles after leaving Neezhnee Novgorod the direction of the Volga is nearly eastward, but just before reaching Kazan it turns to the South and for the next 900 miles runs to the S. S. W., being everywhere thrown strongly against its high right bank by the increasing swiftness of the rotation of the earth's surface as the river decreases its latitude.

The scenery of the upper part of the Volga is much more varied and picturesque than one would expect to find along a river running through a flat and monotonous country. The left bank, it is true, is generally low and uninteresting, but on the other side the land rises abruptly from the water's edge to a height of four or five hundred feet; and its boldly projecting promontories, at intervals of two or three miles, break the majestic river up into long, still reaches, like a series of placid lakes, opening one into another, and reflecting in their tranquil depths the dense

foliage of the virgin forest on one side, and the bold outlines of the half mountainous shore on the other. White walled churches with silver domes appear here and there on the bluffs, surrounded by little villages of unpainted wooden houses with elaborately carved and decorated gables; deep valleys, shaggy with hazel bushes, break through the wall of bluffs on the right at intervals, and afford glimpses of a rich farming country in the interior; and now and then, in sheltered nooks half up the mountain side overlooking the river, appear the cream-white walls and gilded domes of secluded monasteries, rising out of masses of dark green foliage. Sometimes, for half an hour together, the steamer plows her way steadily down the middle of the stream, and the picturesque right bank glides past like a magnificent panorama with a field of vision ten miles wide; and then, suddenly, to avoid a bar, the vessel sweeps in toward the land, until the wide panorama narrows to a single vivid picture of a quaint Russian hamlet which looks like an artistically contrived scene in a theatre. It is so near that you can distinguish the features of the laughing peasant girls who run down into the foreground to wave their handkerchiefs at the passing steamer, or you can talk in an ordinary tone of voice with the moozhiks in red shirts and black velvet trousers who are lying on the grassy bluff in front of the green-domed village church. But it lasts only a moment. Before you have fairly grasped the details of the strange Russian picture, it has vanished, and the steamer glides swiftly into a new reach of the river, where there is not a sign of human habitation, and where the cliffs on one side and the forest on the other, seem to be parts of a vast primeval wilderness.

Picturesque and varied, however, as the scenery of the Volga is, the traveller is not entirely dependent upon it for entertainment. Before he has gone far he is likely to discover that his fellow-passengers are quite as well worth looking at as the banks of the river. The upper deck of a Volga river steamer during the Neezhnee Novgorod fair affords the stranger a curious study in Oriental life, as it is almost certain to be crowded with natives from all parts of Asia. Persian merchants, in conical lamb's wool caps and maroon colored robes slashed with green silk, sit with crossed legs on their soft rugs smoking curious water pipes or fingering strings of wooden beads. Haughty Caucasian mountaineers stride back and forth across the deck with their hands on their long daggers, looking contempt and defiance at their Persian enemies; while flat-faced, stupid-looking Kalmik Tartars gather in groups on the forecastle around huge wooden bowls of soup and boiled rice. Religious exercises of some kind are going on nearly all the time. Five times a day a moolah or Mohammedan priest used to climb up on the bridge of our steamer and summon the faithful to prayers. In less than five minutes the whole deck would be covered with the prostrate forms of praying Moslems, all lying, like human compass needles, with their heads toward Mecca, the North Pole of their religious faith. But the river was very crooked and the unhappy worshippers had hard work of it to keep themselves accurately adjusted with reference to the holy city. Every one of them would take off his hat, boots and weapons, get out his pocket compass, ascertain the direction of Mecca, spread down his prayer rug, and then kneel, shut his eyes and begin to pray. In the meantime the steamer would go around a sharp bend

in the river, and the next time the prayer opened his eyes, he would find himself, to his horror and amazement, with his back to Mecca and his arms stretched out toward the steppes of Siberia. Of course God could not be expected to pay the slightest attention to a prayer which was breathed out in a northeasterly direction when it ought to have been headed southwest by south ½ south. So the disgusted Mohammedan, with a muttered curse upon the crooked rivers and the erratic steamboats of the Russian infidel, would get up, consult his pocket compass, turn around his rug and begin again on a new tack, keeping one eye open meanwhile to see that the man at the wheel did not take an unfair advantage of him and distribute his prayer all over the Russian Empire.

But the Mohammedan is not the only religion which has representatives on the steamer's hurricane deck. If you watch closely at sunset you will see one or two dark, spare, thin-featured fire-worshippers from Bakoo, standing on the western end of the bridge, their lips moving noiselessly, and their eyes fixed with an expression of intense mournful earnestness upon the great red sun as it sinks slowly into the vast steppes of Central Russia; and when it has finally gone, and the faint violet haze of a Russian twilight draws a soft veil over the distant horizon, they turn away with half saddened faces and sit down alone in silence.

Two days after leaving Neezhnee Novgorod, we made a brief stop at the large East Russian City of Kazan, and a few hours later passed the mouth of the Kama, the great highway to Siberia. Steamers ascend the Kama as far as Perm, from which point there is a railroad across the Oorals to Ekaterineburg. This railroad is now being extended to Tumen, a town 200 miles beyond Ekaterineburg,

and from Tumen there is communication, by steamer, with all points on the great Siberian river Ob and its tributaries. It will thus be possible in another year to make an uninterrupted journey of 5,000 miles, by steam, from Charing Cross, London, to the Siberian city of Tomsk—a city which lies as far north as Hudson Bay, and further east than Ceylon.

Just below the mouth of the Kama begins the great wheat-producing belt of the Volga, which extends as far south as Saratof, and includes some of the richest wheat lands in the empire. The population of the three governments of Samara, Saratof and Simbirsk, in which this wheat-producing region is mainly comprised, amounts to nearly five millions, with a density of 41 to the square mile. The most important city of the grain belt is Samara, which has a population of about forty thousand, and from which there are shipped annually, up the Volga, about ten million bushels of grain.

Day after day we steamed swiftly southward down a constantly widening river, with a level steppe stretching away on our left until it blended with the pale blue sky, and on our right a never ending series of bold abrupt bluffs, crowned with clusters of unpainted wooden houses, or lifting high in air the white crenellated walls and golden domes of ancient monasteries. For more than a thousand miles we were rarely out of sight of steamers, barges, or floating craft of one sort or another. There are on the Volga about seven hundred steamers, and the sloops, barges and barkasses are almost innumerable. Never did the river seem lonely or unfrequented. Even at night, when it was veiled in darkness and haze, we knew that it was not deserted, by the faint, far away voice of some float-

ing fisherman, singing, *Vnees po matooshka po Volga*, that song dear to the heart of every Russian boatman, "Down the Mother Volga."

At the city of Tsareetsin, on the lower Volga, we finally lost sight of everything which could by any possibility remind us of Europe. The grassy slopes and the masses of foliage which had given softness and color to the upper river landscapes entirely disappeared; the long line of bluffs, which for more than 1,000 miles had limited our vision to the westward, sank into low hillocks, and then vanished, and the Volga itself, as if it had finally made up its mind to abandon Europe and throw itself into the arms of Asia, turned sharply away to the southeast and entered the great level steppe which borders the Caspian. No description can do justice to the dreariness and monotony of this region in autumn, when the scanty steppe vegetation has been burned up by an almost tropical sun, and nothing meets the eye but a lonely, solitary waste of half-bare earth, scorched grass, dead weeds and hillocks of sand, diversified occasionally by a salt lake fringed with long, waving reeds, or a cluster of Kalmik tents. There are no trees, no fences, no cultivated fields, and no signs whatever of a settled population, except here and there a lonely Cossack station on the river bank, whose fishing boats and long rows of drying seines show that its inhabitants obtain their food from the river, and not from the barren, sun-scorched land.

At Tsareetsin virtually begins the government of Astrakhan, which has an area of 85,000 square miles, and occupies the whole of the extreme southeastern part of European Russia. It is an immense, nearly barren, generally sandy plain, bounded on the south by the Caspian,

and divided into halves by the Volga. In order that you may clearly understand its physical geography it is necessary to review briefly its geological history and its relation to the Caspian sea. There is no longer any doubt that within a comparatively recent geological period—that is during the deposition of the upper layers of the tertiary—the whole of the government of Astrakhan was covered by the waters of the Caspian; and that at a period not much more remote, the Black sea, the Caspian and the sea of Aral, formed one great Mediterranean body of water, which covered a large part of Southeastern Russia and Western Asia, filled the basin of the Volga as far north as the Samara bend, and communicated with the Arctic ocean through a depression on the eastern side of the Ooral range. The proofs of this are abundant and conclusive. According to the computations of Major Wood, who is one of the most recent investigators of the subject, a rise of only 23 feet in the level of the water of the Black sea, would cause it to overflow into the Caspian through a depression on the northern side of the Caucasian range corresponding nearly with the line of the present river and lake of Manitch. This overflow would in time raise the level of the Caspian 108 feet, and enormously extend its area, so that it would cover a great part of Western Asia and nearly the whole of Southeastern Russia. A rise of 135 feet more would cause the united Black and Caspian seas to overflow into the sea of Aral, and a further rise of 62 feet would put all three of these seas in communication with the Arctic ocean through the depression east of the Oorals and the gulf of the Ob. There is some disagreement among Russian geologists as to the time when these three seas were thus in communication with one

another and with the polar basin, but as to the fact there is no doubt.

The characteristic fauna of the Arctic ocean can be traced through a long and almost unbroken chain of salt and brackish lakes, from the gulf of the Ob to the Aral and the Caspian, and in the last named sea are still found such hyperborean forms of marine life as the seal, the herring, the salmon and the belooga or white whale. Exactly how long ago the Caspian receded from the flat plains which now form the government of Astrakhan, it would perhaps be difficult to say; but there is a great deal of evidence to show that the time was not very remote. The Caspian steppe, as far north as Tsareetsin, has every characteristic of a recently dried up sea bottom. It is virtually treeless; its soil consists of clay mixed with sand, and is charged with salt and sulphate of magnesia; it abounds in salt lakes, no less than 700 having been surveyed and laid down on Russian maps; and most of the species of shell fish and crustacea found in these lakes are identical with those found in the Caspian. When one becomes aware that the great steppe of southeastern Russia is nothing but a recently dried up sea bottom one does not wonder so much at its barrenness and monotony.

The climate of the government of Astrakhan, and of the Aralo-Caspian basin generally, is what is known as a continental climate, that is, one which isextremely hot in summer and extremely cold in winter. Many places in the interior of the great steppe north and east of the Caspian have the summer of Constantinople, Nice and Lisbon, while their winter is only one degree warmer than that of Novaya Zemlya.

The only inhabitants of these vast dreary plains are

Asiatic nomads, who wander over them with their herds of horses, cattle and camels, and pitch their keebeetkas, or felt tents, wherever they can find the necessaries of their life—water and grass. Over the steppe, on the western side of the Volga, below Tsareetsin, are scattered about 20,000 tents of the Kalmiks, a tribe of pure Mongols who invaded Southeastern Russia in the year 1630. Most of them returned shortly afterward to their original home in Central Asia, as graphically related by De Quincy in his "Flight of a Tartar tribe;" but those who happened to be on the western side of the Volga were left behind, and submitted to the authority of Russia. On the eastern side of the Volga, in the government of Astrakhan, is another tribe of nomads, known as the inner horde of the Keergees, who also comprise about 20,000 tents, and whose habits are substantially those of the Kalmiks. These two nomadic tribes, who number perhaps 200,000 souls, roam over an area in Southeastern Russia half as large as France, with herds amounting in the aggregate to 60,000 camels, 260,000 horses, 350,000 cattle, and 1,600,000 sheep.

On the 12th of September we reached the half Russian half Asiatic city at the head of the Caspian Sea, which the Tartars, with reckless hyperbole call "The Star of the Desert"—Astrakhan. It is a flat, unhealthful, comparatively uninteresting town of 50,000 inhabitants, situated on one of the islands in the delta of the Volga. It has the usual heterogeneous population of cities in Southeastern Russia, with a few additions such as Hindoos, Persians, Armenians, Jews and natives from the trans-Caucasus. Architecturally it is a straggling collection of commonplace one and two-story houses, just relieved from utter plainness by the always picturesque Russo-Byzantine churches, and the minarets of a few mosques.

Astrakhan is chiefly notable for its fisheries. It is the centre of perhaps the most remarkable fishing region in the world. According to the statements of a correspondent of the St. Petersburg *Golos* who was sent to Astrakhan about two years ago to write up the subject, the fish products of the northern end of the Caspian reach annually the enormous aggregate value of 20,000,000 roubles or $10,000,000, a sum nearly equal to the annual product of all the fisheries of the New England States off the North American coast. The nets and seines of the Caspian sea fishermen, if laid end to end, would reach eight times across the American continent from New York city to San Francisco.

After a brief stay at Astrakhan I took a steamer of the Caspian Sea Navigation Co. for the Caucasus. The shipping of the Caspian sea in 1880, so far as it was registered in Russia, consisted of 35 steamers and 1,007 sailing vessels. Since that time, however, the number of steamers has largely increased. A single firm named Nobel & Co. engaged in the production of petroleum at Bakoo now has a fleet of 12 steamers running between Bakoo and Astrakhan with petroleum in bulk. Unfortunately, the delta of the Volga is so shallow that large sea-going steamers have great difficulty in getting into it. Most of them are obliged to stop at the so-called "Nine-foot station," 100 miles south of Astrakhan, and transfer passengers and cargo.

The gradual but steady filling up of the northern end of the Caspian by the silt, brought down by the Volga, and the lowering of the level of the sea generally, in consequence of the great evaporation from its surface, are causing the Russian Government much anxiety. Many expedients have been suggested to remedy the evil, such as

turning the Oxus into the Caspian, turning the Don into the Volga at Tsareetsin, and reopening the old channel of communication between the Caspian and Black seas, along the line of the Manitch, but none of them have been thought practicable by Russian engineers. The level of the surface of the Caspian is now about eighty-five feet below that of the Black sea, and is steadily but slowly falling, notwithstanding the enormous quantity of water poured into the Caspian basin by the Volga, the Ooral, the Kooma, the Terek, the Koor and other smaller rivers.

Late in September I landed from the Caspian sea steamer at the Caucasian port of Petrovski, just where the level Kalmik steppe begins to be broken up by the foothills of the great Caucasian range. Hiring as guide and interpreter a nondescript vagabond named Akhmet Avarski, whose knowledge of six or seven of the mountain dialects was fully counterbalanced by a record of fourteen homicides, I plunged on horseback into the rugged defiles of the Caucasian highlands.

My life for the next two months was as strange, varied and adventurous as it is possible for a traveller to live, unless he goes into the Himalayas, Thibet or the mountains of the T'yan Shan. The state of society in which I found myself in the wild ravines of Chechnia, was as rude and savage as that which Cæsar found among the barbarians of ancient Gaul; the mountain scenery was on a scale of more than Alpine grandeur; and the mountaineers of the secluded valleys, in the vicinity of what is known as the snowy range, were the most striking and original men I have ever seen.

In these fierce, proud mountaineers, I soon became deeply interested, and it was for the purpose of studying them,

rather than geography, that I three times crossed the main range, and wandered back and forth through the mountains from Daghestan to the Dariel pass.

I cannot undertake, almost at the end of a lecture, to add anything to the account I have already given this Society of the origin, history and life of the Caucasian mountaineers, but I wish to give you some idea, if I can, of their inner thoughts and character, as I became acquainted with them during these months of wandering, through their salutations, their oaths and their proverbs.

The etiquette of salutation in the Caucasus is extremely elaborate and ceremonious. It does not by any means satisfy all the requirements of perfect courtesy to ask a mountaineer how he is, or how his health is, or how he does. You must inquire minutely into the details of his domestic economy, manifest the liveliest interest in the growth of his crops and the welfare of his sheep, and even express a cordial hope that his house is in a good state of repair, and his horses and cattle properly protected from any possible inclemency of weather. Furthermore, you must always adapt your greeting to time, place and circumstances, and be prepared to improvise a new, graceful and appropriate salutation to meet any extraordinary exigency. In the morning a mountaineer greets another with, "May your morning be bright," to which the prompt rejoinder is, "And may a sunny day never pass you by." A guest he welcomes with, "May your coming bring joy," and the guest replies, "May a blessing rest on your house." To one about to travel the appropriate greeting is, "May God make straight your road"; to one returning from a journey, "May health and strength come back with rest." To a newly-married couple, "May you have sons like the

father and daughters like the mother"; and to one who has lost a friend, "May God give you what he did not live to enjoy."

Among other salutations in frequent use are: "May God make you glad"; "May your sheep be multiplied"; "May you blossom like a garden"; "May your hearth-fire never be put out," and "May God give you the good that you expect not."

The curses of the Caucasus are as bitter and vindictive as its greetings are courteous and kind-hearted. I have often heard it said by the Persians and Tartars who live along the Lower Volga that there is no language to swear in like the Russian, and I must admit that they illustrated and proved their assertion, when occasion offered, in the most fluent and incontrovertible manner; but I am convinced, after having heard the curses of experts in all parts of the East, that for variety, ingenuity and force the profanity of the Caucasian mountaineers is unsurpassed. They are by no means satisfied with damning their adversary's soul, after the vulgar manner of the Anglo-Saxon, but invoke the direst calamities upon his body also; as, for example: "May the flesh be stripped from your face"; "May your heart take fire"; "May eagles drink your eyes"; "May your name be written on a stone" (that is, a tombstone); "May the shadow of an owl fall on your house" (this, owing probably to the rarity of its occurrence, is regarded as a fatal omen); "May your hearth-fire be put out"; "May you be struck by a hot bullet"; "May your mother's milk come with shame"; "May you be laid on a ladder" (alluding to the Caucasian custom of using one of the house-ladders as a bier); "May a black day come upon your house"; "May the earth swallow

you"; "May you stand before God with a blackened face"; "Break through into hell" (that is, through the Mohammedan bridge of Al Sirat); "May you be choked with blood."

Besides these curses, all of which are uttered in anger, the mountaineers have a number of milder imprecatory expressions which they use merely to give additional force or emphasis to a statement. A man, for instance, will exclaim to another: "Oh, may your mother die—what a splendid horse that is!" or, "May I eat all your diseases if I didn't pay twenty-five *abaz* for that dagger in Tiflis." The curious expression, "May your mother die," however malevolent it may sound to occidental ears, has in the Caucasus no offensive significance. It is a mere rhetorical exclamation point intended to express astonishment or to fortify a dubious statement. The graphic curse, "May I eat all your diseases" if something isn't so, is precisely analagous to the American boy's "I hope to die if it isn't true."

Generally speaking, the mountaineers use angry imprecations and personal abuse of all kinds very sparingly. Instead of standing and cursing one another like enraged Billingsgate fish-women, they promptly cut the Gordian knot of their misunderstanding with their long double-edged daggers, and presently one of them is carried away on a ladder. When, as a Caucasian proverb asserts, "it is only a step from the bad word to the knife," even an angry man is apt to think twice before he curses once.

It is difficult to select from the proverbs of the Caucasian mountaineers any which are certainly and peculiarly their own. They inherit the proverbial philosophy of all the

Aryan and Semitic races, and for the most part merely repeat, with slight variations, the well-worn saws of the English, the Germans, the Russians, the Arabs and the French. I will give, however, a few specimens which I have not been able to find in modern collections, and which are probably of native inventions. It will be noticed that they are all more remarkable for force, and for a peculiar grim, sardonic humor than for delicacy of wit or grace of expression. Instead of neatly running a subject through with the keen, flashing rapier of a witty analogy, as a Spaniard would do, the Caucasian mountaineer roughly knocks it down with the first proverbial club which comes to hand, and the knottier and more crooked the weapon, the better pleased he seems to be with the result. Whether the work in hand be the smiting of a rock or the crushing of a butterfly he swings high overhead the hammer of Thor. Compare, for example, the French and the Caucasian methods of expressing the fact that the consequences of bad advice fall on the advised and not on the adviser. The Frenchman is satisfied to simply state the obvious truism that advisers are not payers, but the mountaineer, with forcible and graphic imagery, declares that "he who instructs how to jump does not tear his mouth, but he who jumps breaks his legs." Again, the German has in his proverbial storehouse no more vivid illustration of the wilfulness of luck than the saying that "a lucky man's hens lay eggs with double yolks"; but this is altogether too common and natural a phenomenon to satisfy the mountaineer's conception of the power of luck, so he coolly knocks the subject flat with the audacious hyperbole, "A lucky man's horse and mare both have colts." Fortune and misfortune present

themselves to the German mind as two buckets in a well, but to the Caucasian mountaineer "fortune is like a cock's tail on a windy day" (that is, first on one side and then on the other). The Danes assert guardedly that "he loses least in a quarrel who controls his tongue," but the mountaineer cries out boldly and emphatically, "Hold your tongue and you'll save your head"; and in order that the warning may not be forgotten, he inserts it as a sort of proverbial chorus at the end of every paragraph in his oldest code of written law. It is not often that a proverb rises to such dignity and importance as to become part of the legal literature of a country; and the fact that this particular proverb should have been chosen from a thousand others and repeated twenty or thirty times in a brief code of criminal law, is very significant of the character of the people.

Caucasian proverbs rarely deal with verbal abstractions, personified virtues, or vague intellectual generalizations. They present their ideas in hard, sharp-edged crystals, rather than in weak verbal solutions, and their similes, metaphors and analogies are as distinct, clear-cut, and tangible as it is possible to make them. The German proverb, "He who grasps too much lets much fall," would die a natural death in the Caucasus in a week, because it defies what Tyndall calls "mental presentation"; it is not pictorial enough; but let its spirit take on a Caucasian body, introduce it to the world as "You can't hold two watermelons in one hand," and it becomes immortal. Vivid imagery is perhaps the most marked characteristic of Caucasian proverbs. Wit, wisdom and grace may all occasionally be dispensed with, but pictorial effect, the possibility

of clear mental presentation, is a *sine qua non.* Aiming primarily at this, the mountaineer says of an impudent man, "He has as much shame as an egg has hair"; of a garrulous one, "He has no bone in his tongue," or, "His tongue is always wet"; of a spendthrift, "Water does not stand on a hillside," and of a noble family in reduced circumstances, "It is a decayed rag, but it is silk."

All these metaphors are clear, vivid and forcible, and the list of such proverbs might be almost indefinitely extended. With all their vividness of imagery, however, Caucasian sayings are sometimes as mysterious and unintelligible as the darkest utterances of the Delphian oracle. Take, by way of illustration, the enigmatical proverb, "He lets his hasty pudding stand over night, hoping that it will learn to talk." Only the rarest penetration would discover in this seemingly absurd statement a satire upon the man who has a disagreeable confession to make or an unpleasant message to deliver, and who puts it off until to-morrow, hoping that the duty will then be easier of peformance. Again; what would a West European make of such a proverb as the following: "If I had known that my father was going to die, I would have traded him off for a cucumber." Our English cousins, with their characteristic adherence to facts as stated, would very likely cite it as a shocking illustration of the filial irreverence and ingratitude of Caucasian children; but an American, more accustomed to the rough humor of grotesque statement, would see at once that it was not to be "taken for cash," and would understand and appreciate its force when he found its meaning to be that it is better to dispose of a perishable article at half price than to lose it altogether—better to sell your father for a cucumber than have him die on your hands.

The cruel, cynical, revengeful side of the mountaineer's character finds expression in the proverbs, "A cut-off head will never ache," "Crush the head and the tail will die of itself," "If you can't find a Lak (a member of a generally detested tribe), hammer the place where one sat," "What business has a blind man with a beautiful wife," "The serpent never forgets who cut off his tail, nor the father who killed his son." The lights and shades of polygamous life appear in the sharply contrasted proverbs, "He who has two wives enjoys a perpetual honeymoon," and "He who has two wives doesn't need cats and dogs." The bad consequences of divided responsibility are indicated by the proverb, "If there are too many shepherds the sheep die." And the value of a good shepherd is stated as tersely and forcibly as it well could be in the declaration that "A good shepherd will get cheese from a he goat."

Caucasian proverbs, however, are not all as rude, unpolished and grotesque as most of those quoted. Some of them are simple, noble and dignified; the undistorted outcome of the higher and better traits of the mountaineer's character. Among such are "Dogs bark at the moon, but the moon does not for that reason fall upon the earth," "Blind eyes are a misfortune, but a blind heart is worse," "He who weeps from the soul weeps not tears but blood," "Generous words are often better than a generous hand," "A guest, a man from God," and finally that really noble proverb, "Heroism is endurance for one moment more." No words could better express the steady courage, the unconquerable tenacity, the proud, silent fortitude of a true Caucasian highlander. At all times and under all circumstances, in pain, in peril, and in the hour of death, he holds

with unshakable courage to his manhood and his purpose. Die he will, but yield never. The desperate fifty years' struggle of the Caucasian mountaineers with the bravest armies and ablest commanders of Russia, is only a long blood-illuminated commentary upon this one proverb.

I do not know whether these greetings, curses and proverbs are as significant to you as they are to me of the character of the people who invented them; but you must, I am sure, admit that they afford at least indications of great latent capability, of unusual versatility of talent and of a wide range of human sympathy and feeling.

My life in the Eastern Caucasus for two months after leaving Petrofski, was in every sense of the words a vagabond life. Day after day and week after week I wandered from village to village, through the magnificent scenery of Daghestan, now climbing above the clouds to lonely shepherds' huts on the mountains, ten thousand feet above the sea, then descending into gloomy valleys almost as deep and wonderful as the cañons of Colorado, and sleeping every night in the little stone houses of the mountaineers. Sometimes, in parts of the mountains which were regarded as dangerous, I travelled in state with an armed escort of twenty-five or thirty Russian cavalrymen; sometimes I walked from one settlement to another with strolling Jews, and ate my supper out of an iron kettle with a pine splinter and a wooden spoon. Everywhere I was treated by the mountaineers with unvarying kindness and hospitality, and when I was finally driven out of the mountains of Daghestan by snow and winter weather, I turned my face homeward with reluctance and regret.

About the middle of November I proceeded by the chain

of Cossack stations known as the armed line of the Terek from the northern boundary of Daghestan to the Russian settlement of Vladi Kavkaz, crossed the Caucasian range through the Dariel pass to Tiflis, and on the 27th of November took a steamer for Constantinople at Poti, the port of the Caucasus on the Black sea, where my journey through Southeastern Russia ended.

MEXICO: HER PHYSICAL GEOGRAPHY AND RESOURCES.

BY

ALFRED R. CONKLING.

At the present day no foreign country possesses so large a share of importance to the people of the United States as Mexico. Lying between the fifteenth and thirty-second parallels of north latitude, the Mexican Republic has an area of 756,336 square miles,* or about sixteen times the size of the State of New York.

The northern frontier is defined by the Rio Grande, the Territories of New Mexico and Arizona, and the State of California. The southern boundary is marked by the Republic of Guatemala and the Territory of Balize, or British Honduras; while the Gulf of Mexico and Pacific Ocean respectively bound the east and west coasts.

A continuation of the cordillera of South America traverses the Republic, and has received the local name of the Sierra Madre. The general direction of this chain of mountains is from southeast to northwest. It has a moderate elevation in the southern States of Chiapas and Oaxaca; but, in latitude 19°, the mean altitude is about 9,000 feet above the sea-level, and two peaks, Popocatepetl and Orizaba, respectively rise to the great elevations of 17,720 feet and 17,200 feet. The former mountain is the culminating point of North America.

On the twenty-first parallel the cordillera becomes very

* 1,958,912 square kilometres.

wide, and is divided into three ranges. The eastern branch runs to Monclova and Villaldama; the western branch traverses the States of Jalisco and Sinaloa, and subsides in Northern Sonora; while the central ridge extends through the States of Zacatecas, Durango, and Chihuahua, forming the water-shed of the northern table-land. The range decreases in elevation in going northward.

A row of six volcanic mountains stretches across the cordillera, four of which are clothed with perpetual snow, and form some of the highest land in the western hemisphere.

The names of these volcanoes, beginning on the west, are Colima, Jorullo, Toluca, Popocatepetl, Iztaccihuatl, and Orizaba.

That great traveler and scientist, Baron von Humboldt, has stated in *Cosmos*, Vol. V., page 265, that these volcanoes lie on the same great vent in the earth's crust, between the latitudes of 18° 59′ and 19° 20′, thus indicating the direction of a fissure of volcanic activity of 360 geographical miles in length.

Excepting Jorullo, all of these mountains had been upheaved before the Spanish Conquest.

This new volcano deserves more than a passing notice. It rose on the night of September 28, 1759, from a broad plain having an altitude of 2,580 feet above the sea-level.

Jorullo lies about eighty miles from the Pacific Ocean, and fully 120 miles from any other volcano. The eruption was preceded for at least three months by an uninterrupted subterranean noise. At the point where the great volcano now stands there was formerly a dense wood of the *guayava*. On the day before the eruption, laborers from the *cañaverales*, or sugar-cane fields of an adjoining *hacienda*, had gone out to gather the fruit of the *guayava*. Upon

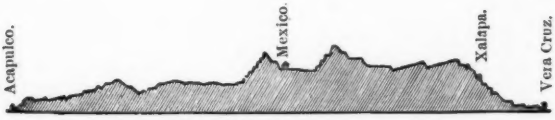
their return it was remarked with astonishment that their large straw hats were covered with volcanic ashes. Fissures had been formed in the earth's surface, which threw out ashes, before any apparent change of level had occurred in the plain.

In the early hours of the night of September 28 the black ashes already lay a foot deep. Every one fled toward Aguasarco, a small Indian village situated on a neighboring hill, 2,500 feet above the old plain of Jorullo. From this height a large tract of land was seen in a state of fearful, fiery commotion; and in the midst of the terrible flames there appeared a great shapeless mass resembling a black castle.

The accounts of the eye-witnesses state, that on the day of the eruption the flat soil was seen to rise perpendicularly, and the entire mass became more or less inflated, so that colossal blisters appeared, of which the largest is now the volcano. These inflated blisters were of various sizes, and had a tolerably regular conical form. They subsequently burst, and threw boiling hot earthy mud from their orifices, as well as scoriaceous stony masses, which are still found at an immense distance from the volcano. The heat, which characterized the eruption, was so intense that for many years the environs of Jorullo had not cooled to their normal condition. In the year 1780, or twenty-one years after the eruption, cigars might still be lighted, when fastened to a stick and projected to a depth of two or three inches into the *hornitos*, or little ovens, the name given to the conical protuberances of the plain. In some places the air was so much heated near the *hornitos* that travelers found it necessary to turn aside from their proposed course.

Referring to the eruption of the volcano, Humboldt remarks, that the natives ascribe the wonderful change in the earth's surface to the work of the monks. At the Playas de Jorullo, the Indian, whose hut the German traveler occupied, told him that in 1759 the Capuchins belonging to the mission preached at San Pedro, but failed to receive hospitable treatment. Accordingly, they pronounced anathemas upon this beautiful and fertile plain, predicting first of all, that the houses would be destroyed by flames, which would issue from the earth, and that afterward the surrounding air would cool to such a degree that the neighboring mountains would remain eternally covered with snow and ice. The former of these maledictions having been verified, the lower class of Indians already see in the gradual cooling of the volcano the presage of a perpetual winter.

Nearly one-half of the superficial area of Mexico is composed of an elevated plateau having a mean height of about 6,000 feet about the sea-level. This plateau extends from the frontier of the United States almost to the Isthmus of Tehuantepec. It is widest in the latitude of the national capital, being about 350 miles at this point, and contracts gradually toward the south.



Mexican Table-land.

From "Appleton's Guide to Mexico."

The principal table-lands of the northern plateau are, that of Chihuahua, which lies north of latitude 24°, and east of

the Conchos and Florida rivers, and having an elevation of of from 4,000 to 6,000 feet, and that of Anahuac, which is from 6,000 to 8,000 feet high. There are four distinct table-lands on the central plateau, as follows:

That of Toluca,	having a mean	elevation of	8,570 feet.
That of Tenochtitlan,	"	"	7,470 feet.
That of Aclopan,	"	"	6,450 feet.
That of Istla,	"	"	3,320 feet.

Two passes, about 500 miles apart, afford an outlet from the great table-land to the eastward—viz., that of Jalapa, through which Cortez build a road during the Conquest; and one at Saltillo, through which the United States troops reached the plateau during the Mexican War.

Referring to the uniform character of the surface of the great plateau, Humboldt has remarked that the traveler may proceed in a four-wheeled carriage on the ridge of the table-land, from the City of Mexico to Santa Fé, a distance of at least 1,200 miles, without the advantage of artificially prepared roads.

The country is divided into three hypsometrical zones, as follows:

The *tierra caliente*, or hot region, extending from the sea-level to an elevation of about 2,500 feet; the *tierra templada*, or temperate region, ranging from 2,500 to 5,000 feet; and the *tierra fria*, or cold region, which lies above 5,000 feet.

The first-named zone borders the Republic on the east for about seventy miles, and on the west for about fifty miles.

It has the usual high temperature characteristic of equatorial latitudes. Here sandy plains are intermingled with morass and dense jungle in which tower up trees of that luxuriant growth which is found only within the tropics. The attention of the traveler is kept constantly on the *qui*

vive, by the brilliant plumage of the birds, the beautifully variegated hues of the insects, and the gorgeous colors and grateful fragrance of the flowers that belong to this realm of eternal summer. Among the flora of this zone may be mentioned the vanilla, sarsaparilla, indigo, cassava, anise-seed, various fruits, and the flowering cocoa-palm.

In the *tierra templada*, the aspect of nature essentially changes. The atmosphere is frequently moist, as here the cool air descends from the great plateau and meets the heated atmosphere which ascends from the hot zone. The sugar-cane and the banana, the large leaves of which oftentimes shade the coffee plant, are common, as well as many kinds of vegetables. Camphor and bamboo trees also grow in abundance.

In the *tierra fria*, the change of fauna, flora, and climate has become so strongly marked, that the traveler may easily imagine himself in a high northern latitude. The rosewood, mahogany, ebony, and Brazil-wood of the low country are replaced by the oak, willow, poplar, elm, ash, pine, and other coniferous trees. The traveler will also see the magnificent primeval forests of the cypress, with graceful festoons of the so-called Spanish moss, hanging from the branches, and swinging to and fro in the gentle breeze like the loosened ropes of a ship. Indian corn, although grown in the other great natural terraces, thrives on the table-land. The same remark will apply to the *maguey*, or aloe, which is extensively cultivated. The cereals, especially wheat and barley, are also raised. On the northern plateau the varieties of the cactus family are plentiful. Among them are the *organo*, resembling the pipes of an organ, the curious *pitahaya* with its gorgeous flowers, the giant cactus rising occasionally to a height of

forty feet, and the *nopal* whose branches bear an edible fruit.

On account of the narrowness of that portion of the continent, which does not admit of the collection of a great mass of water, Mexico contains very few navigable streams, the principal ones being the Goatzacoalcos, Tabasco and Panuco rivers. There are sand-bars at the mouths of some of the rivers, on which the depth of water at low tide is not more than three or four feet. Several streams might be made navigable at comparatively small expense. This fact applies especially to the Rio de Santiago, the longest river in the Republic, according to Humboldt, who states that it is as long as the Elbe or Rhone, and that the grain from the States of Guanajuato and Jalisco could be thus transported to the western coast.

The following list gives the names and lengths of the principal rivers in Mexico:

	Miles.		Miles.
Rio de Santiago	542	Rio Panuco	286
Rio de las Balzas	418	Rio de Sinaloa	277
Rio Yaqui	338	Rio de Ures	208
Rio Conchos	338	Rio de Culiacan	156
Rio de Tabasco	344	Rio de Goatzacoalcos	112
Rio Usumasinta	341		

Several of these streams descend rapidly from the Sierra to tide-water in a comparatively short distance.

There are many lakes on the Mexican plateau, most of which are little more than extensive lagoons. They are merely the remains of large basins of water which formerly existed on the high plains of the cordillera. The majority of these lakes have no outlet, and are accordingly filled with salt water. Owing to rapid evaporation, their surface

is continually diminishing. The Lagoon of Terminos, on the coast of the Gulf of Campeche, is the largest in Mexico, but it is an arm of the sea, rather than a lake. Lake Chapala in Jalisco is the largest inland body of fresh water. Lakes Patzcuaro and Cuitzeo in Michoacan are next in importance.

There are many islands that belong to Mexico off the northwest coast. Several islands are also found in the Bay of Campeche and off the eastern coast of Yucatan.

Formerly one of the most interesting features in the physical geography of the country was the so-called *floating islands* of Lake Texcoco in the Valley of Mexico. They do not exist at the present day. They were formed of small masses of earth, covered with herbs, and held together by matted roots, and were detached from the shore of the lagoon by the waves during stormy weather. These fertile islets are known to have been in use as far back as the end of the fourteenth century. They were afterward artificially constructed by the Aztecs by making rafts of reeds, rushes, roots and brushwood, and covering these with black mold naturally impregnated with muriate of soda, but gradually purified from the salt and rendered fertile by washing it with the water of the lake.

No country on the globe has a greater variety of climate than Mexico. The mean annual temperature of the three zones is as follows: For the *tierra caliente*, 77°; for the *tierra templada*, from 68° to 70°; and in the *tierra fria*, 62° Fahr. Sudden changes of temperature are rare in the latter and in the *tierra templada*, but they are more frequent in the former zone. In Vera Cruz, the mercury often stands at 90° in the warm season, but if the wind suddenly changes to the northward, it will sink to 65° Fahr. in a few hours.

The rainy season varies slightly in different parts of Mexico, but always occurs in the summer months. In Yucatan, Campeche, Tabasco and Chiapas, it lasts from May to October, while the season begins a little later and ends a little earlier in the States of Oaxaca and Guerrero. In the latitude of the national capital, the rains fall between June 1st and October 1st, with occasional showers during the winter, especially in February, when the weather is very changeable. The Mexicans have a proverb which runs thus:

> "Febrero loco,
> Porque de todo,
> Tiene un poco,"

which, being interpreted, means, February is a fool because it has a little of everything, *i. e.*, all kinds of weather. The average annual rainfall at the City of Mexico amounts to fifty-nine inches, and that at Vera Cruz is equal to sixty-six inches. In the northern part of Mexico, the rainy season occurs in the months of July, August, September, and half of October.

Snow falls in winter at an elevation of about 8,500 feet. According to Humboldt, the line of perpetual snow in Mexico is 15,091 feet above the level of the sea.*

The atmosphere on the Mexican plateau is very dry. This aridity proceeds from two causes: 1. The evaporation that occurs on great plains, which is increased by the height of the table-land; and, 2. The country is not sufficiently elevated for a considerable number of the mountains to penetrate the region of perpetual snow. Strangers are liable to suffer from thirst and chapped lips on arriving in the Valley

* Under the equator the snow-line is estimated at 15,750 feet.

of Mexico, owing to the dryness of the climate. The nights are cold throughout the year on the great table-land north of the eighteenth parallel of latitude. In general, the temperature will sink as low as 45° Fahr., and the thermometer will fall to the freezing point occasionally on the higher plains. The coldest part of the night is just before daybreak. In the vicinity of the snow-clad mountains the sky is usually free from clouds in the early morning, but toward nine o'clock they rise gradually, and often cover the higher peaks for the remainder of the day. In the *tierra caliente*, and in the greater part of the *tierra templada*, a clear sky frequently prevails throughout the year, except for a few hours of the day during the rainy season. Strong winds are common on the table-land, and the dust often rises in clouds on the sandy plains.

New Spain was formerly divided into ten districts, viz.: The kingdoms of Mexico, New Galicia and Leon; the colony of New Santander, and the provinces of Texas, Coahuila, New Biscay, Sonora, New Mexico and the two Californias.

The country was subsequently partitioned into twelve intendancies and three provinces, as follows:

1. The province of New Mexico.
2. The intendancy of New Biscay, or Durango.
3. The province of New California.
4. The province of Old California.
5. The intendancy of Sonora.
6. The intendancy of San Luis Potosi.*
7. The intendancy of Zacatecas.
8. The intendancy of Guadalajara.
9. The intendancy of Guanajuato.
10. The intendancy of Valladolid.

* The largest as regards area.

11. The intendancy of Mexico.*
12. The intendancy of Puebla.
13. The intendancy of Vera Cruz.
14. The intendancy of Oaxaca.
15. The intendancy of Merida, or Yucatan.

The Republic of Mexico is now divided into twenty-seven States, one Territory and one Federal District. The several States are subdivided into 48 departments, 170 districts, 48 cantons, 110 counties, 1,411 municipalities, 146 cities, 378 towns, 4,886 villages, 872 hamlets, 6 missions, 5,869 haciendas, and 14,705 ranches.

The following is a list of the Mexican States, classified according to superficial area:

	Square kilometres.		Square kilometres.
Chihuahua	227,716	Michoacan de Ocampo	55,693
Sonora	209,694	Chiapas	43,930
Lower California (Territory)	152,847	Nuevo Leon	38,156
Coahuila de Zaragoza	152,517	Tabasco	32,935
Jalisco	114,896	Puebla	31,120
Durango	110,463	Mexico	25,972
Yucatan	84,585	Hidalgo	21,693
Tamaulipas	75,191	Guanajuato	20,276
San Luis Potosi	71,210	Querétaro de Orteaga	8,300
Vera Cruz-Llave	71,116	Colima	7,136
Oaxaca	70,838	Aguascalientes	5,776
Sinaloa	69,211	Morelos	4,536
Zacatecas	68,596	Tlaxcala	3,898
Guerrero	68,568	Federal District	231
Campeche	67,539		
Total			1,958,912

Agriculture in the Aztec Empire was the most important of all the industrial arts. In the natural openings of the primeval forest, or in a fertile strip of interval, the

* The largest in population.

Aztecs planted beans and Indian corn. Excepting the nobility and soldiery, the cultivation of the soil gave employment to the greater part of the population. The more important branches of husbandry were, the culture of the banana, which was easily grown and gave exuberant returns; the production of *chocolatl* from the cocoa-palm; the cultivation of the vanilla, which, however, was confined to a small strip of the sea-coast; and the planting of maize and the *maguey*. Prescott calls the latter "a miracle of nature," on account of the large number of articles that are made from it. The Mexicans pressed the stalks of Indian corn to obtain the sap for the production of sugar. There is no evidence that the tillage of the country was materially improved for many years after the Spanish Conquest.

Almost a century elapsed before the Spaniards introduced new plants, like wheat and the other cereals. Notwithstanding the fact that Mexico has been governed by Europeans during nearly four centuries, and considering the existence of an easily worked and fertile soil, agriculture is still in its infancy in the major part of the Republic. This is due, in great measure, to the persistency of the peons in adhering to the rude implements of their forefathers. They plow to a depth of but three or at most four inches, with a crooked wooden stick, shod with iron, which is attached to the horns of the oxen. The hoe serves as their scythe, sickle and reaper. The *machete*, or cutlass, is used in place of the axe. Living in the most primitive manner as the peons do, but little ground is required for cultivation. They raise just sufficient crops to meet their absolute needs.

Since the Spanish Conquest the mines have been developed at the expense of the vegetable resources. The ambition

of Cortez and his followers was to increase the production of the precious metals. Accordingly, agriculture did not receive any considerable share of attention from the invaders. Doubtless Mexico would be a far richer country to-day had the Spaniards devoted themselves to the cultivation of the soil with as much energy as they displayed in their quest for gold. So brilliant has been Mexico's record in the production of gold and silver, that the world at large seems to have underestimated, if not wholly overlooked, her agricultural capacity.

The crops in Mexico are dependent partly upon rainfall and partly upon irrigation. North of the nineteenth parallel, irrigation is necessary. Referring to this important subject, Humboldt has remarked in his *Political Essay on New Spain*, Vol. II., page 455: "Were the soil of Mexico watered by more frequent rains, it would be one of the most fertile countries cultivated by man in either hemisphere." The prosperity of the Republic depends upon the proportion of dry and wet season. In the Southern States the rains are generally limited to one continuous season, which varies from five to seven months in the year. As in other tropical latitudes, a deluging rain oftentimes does more harm than good to the growing crops.

The farmer, of course, takes advantage of the rainy season, and in the Northern and Central States he sows in May and reaps in October. Two crops of wheat and Indian corn are grown annually in various sections of the *tierra caliente* and *tierra templada* and even in portions of the *tierra fria*. The second crop is, however, sometimes destroyed by a premature frost. In the States of Vera Cruz, Oaxaca, Guerrero, Tabasco, Mexico, Jalisco and Sinaloa, *three* crops of maize are cultivated in a single year!

They are called respectively the *riego*, *temporal* and *tonalmile*.

As irrigation is necessary for *more* than one-half of the surface of the country, let me now consider this subject. In the Aztec Empire *acequias*, or irrigating ditches, were used. The Spaniards were agreeably surprised to find a system similar to that which the Moors had established in the Iberian Peninsula. The plan of watering the soil by artificial channels, however, is at present limited to a comparatively small portion of the arable land in the country. In order to increase the annual yield of grain and vegetables, the Mexicans will perhaps find it necessary to adopt the system of tanks which has been in use so long in Hindostan.

Having had occasion to examine the system of tanks and ditches for irrigation during my travels both in British India and Spain, I venture to digress for a moment and describe them. British India comprises about the same superficial area as Mexico. In the north, great rivers like the Indus and Ganges are tapped, and a portion of the main stream is diverted from its course by a series of canals. The water is thus distributed over the country for the purpose of irrigation.

In Southern India and in the Carnatic tanks are built by making an artificial wall across a ravine. In this manner crops are grown which support a population of about a hundred millions, or ten times the present population of Mexico. The failure of the crops, which causes the terrible famines of Hindostan, is frequently owing to a long season of drought or to defective irrigation. When, at the end of the eighth century of our era, the Moors conquered Spain, they built a system of tanks and ditches, second in extent and ingenuity to none on the face of the globe.

After seven centuries of occupation the crescent was expelled from the Peninsula in the reign of Ferdinand and Isabella, and the cross was planted in the shadow of the Saracenic arch. Thus did the Spaniards learn the importance of irrigation from their Moslem enemies, and accordingly practiced it in their transatlantic kingdom, which they called New Spain.

Now to return to Mexico, let me say that not more than ten millions of people inhabit the country. Unlike India, Mexico has no huge rivers affording a powerful head of water. In the *tierra templada*, where a few waterfalls may be found, the streams might be diverted from their course and employed for irrigation at very slight expense. Corporations may in future be organized for the purpose of irrigation, and the ravines or *barrancas* of the *sierra* will be converted into reservoirs for the storage of a supply of water to be used for seasons of drought.

By the means thus indicated, the soil of Mexico might be made to yield a hundred-fold more grain than is now produced, and the Republic would be eventually enabled to compete with the States of California and Oregon in exporting the cereals to Europe.* Grain is now sent from California to New Orleans, La., *via* the Southern Pacific Railroad. The cereals of Northern Mexico might be transported to the seaboard by the same route. This subject is perhaps worthy of the attention of foreign capitalists.

As regards the amount of cereals cultivated within a given area in Mexico it may be remarked, that the proportion of grain to seed varies from forty to one to four hundred to

* Notwithstanding her immense mineral resources, California has since 1876 yielded more in agricultural products than from her mines. This State resembles Mexico in soil and in outline. According to Señor M. Romero, more wheat can be raised in Sonora alone than in all California.

one. An average yield would be about one hundred and fifty to one. In very fertile land one *fanega* (about three bushels) of seed will produce four hundred *fanegas* of maize. Humboldt has stated that the finest soil on the plateau is to be found in the rich plains lying between the cities of San Juan del Rio and Leon.

Next to the cereals, the great staple products of Mexico are coffee, sugar, tobacco, cocoa, and cotton. All except the last-named are exported.

Among these commodities coffee is the most important to Americans. According to the Hon. J. W. Foster, the late Minister of the United States to Mexico, enough coffee can be grown in that Republic for the entire consumption of this country, amounting in the year 1882 to 455,000,000 pounds. This plant grows best in the *tierra templada* and in the shade of the forest. The State of Vera Cruz yields the largest quantity. Colima ranks next, and produces the finest variety of the article. It rivals the choicest Mocha berry. There is a great demand by epicures in foreign countries for Mexican coffee; and doubtless the annual production will soon be greatly augmented.

Sugar-cane grows in the *tierra caliente* and *tierra templada* up to an elevation of 5,000 feet. In the latter, eighteen months are required for the crop to mature, while in the former the time varies from nine to twelve months. The sugar-cane of Mexico is of three kinds—viz., those of Castile, Havana, and Otaite. In the year 1803 about 14,000,000 pounds of sugar were exported annually. The amount did not exceed 500,000 pounds in the year 1881.

Tobacco is indigenous to Mexico. Indeed, it derives its name from the town of Tobaco in Yucatan. The culture of tobacco was formerly restricted by law to the vicinity of

Orizaba. At present it grows chiefly in the States of Vera Cruz, Tabasco, Campeche, Yucatan, Oaxaca, Sinaloa, Chiapas, and Jalisco.

Cocoa is found in the States of Tabasco, Chiapas, Oaxaca, Guerrero and Colima. The first-named State produces the largest amount, the culture of cocoa being the principal branch of its agricultural industry. Chiapas ranks second, and but little of this article grows in the remainder of the Republic.

Cotton is cultivated in about half the number of the States. Vera Cruz produces the largest quantities, and Durango ranks next. The finest cotton comes from the Pacific coast States and from Vera Cruz. It is also grown extensively in the vicinity of the lagoon of Tlahualila (which is familiarly called the "laguna country"), and in Southern Chihuahua. According to Señor Busto, an acre of land in the State of Vera Cruz will yield about 2,000 pounds of cotton as an average.* It thrives up to an elevation of five thousand feet. In the year 1803 the annual exportation of cotton amounted to 700,000 pounds. At present it is not exported, nor is it cultivated in sufficient quantities for home consumption.

Vanilla and sarsaparilla are grown in the States of Vera Cruz, Tamaulipas, and Tabasco. According to Humboldt, Europe received its entire supply of the former commodity from Mexico previous to the year 1812.

With the improved processes of tillage, including the use of modern implements, extensive tanks, and irrigating ditches, all of which are likely to be introduced at an early day, the staple products of Mexico will of course be increased many fold.

* In the southern part of the United States, 1,000 pounds of cotton to the acre is a fair average.

The culture of sugar, cocoa, and tobacco is, and will doubtless continue to be, more profitable than that of the cereals. The cultivation of the tropical and semi-tropical fruits will also be carried on far more extensively than at present throughout the *tierra caliente*, and in parts of the *tierra templada*.

The crooked wooden stick will be replaced by the steel-beam and mould-board, or sulky plow; the *machete* by the axe and brush-scythe; the bare threshing ground, where sheep and cattle trample out the grain, by the steam-thresher, and the hooked-sickle by the header and self-binder.

Agricultural implements are admitted free of duty. American reapers, mowers, plows, etc., have lately been introduced on the farms of the northern and central part of the table-land. Time will, however, be required to induce the peons to abandon their rude ancestral tools that simply scratch the ground. Labor is abundant at three *reales* (37½ cents) a day. It is hardly necessary to remark, that the land will be best developed by the immigration of skilled farmers from Europe and the United States.

The mineral resources next demand attention.

The cordillera, from Chihuahua on the north, to the Isthmus of Tehuantepec on the south, contains almost inexhaustible deposits of gold, silver, iron, copper and lead; while zinc, mercury, tin, platinum, and coal occur in a few localities. Before the Spanish Conquest the mines of gold, silver, copper and tin were worked by the Aztecs. As the reduction of these metals from their ores was simple, it should not be supposed that the ancient Mexicans possessed a thorough knowledge of the art of metallurgy.

Gold was used largely for ornament and to a limited ex-

tent as money in the Aztec Empire; but the accounts given by the chroniclers of the time of the fabulous amount of this metal used by the Mexicans have been greatly exaggerated. It is, however, true that Cortez seized a large quantity of gold at the capitulation of Tenochtitlan, the ancient capital.

Few mines were in operation at the time of the Spanish invasion, and for twenty-five years after that period. In the year 1548, the silver deposits of Zacatecas were discovered, and twelve years later the great vein of Guanajuato began to be developed. For nearly two centuries the supply of silver in Mexico was derived chiefly from the mines of these two districts. About the year 1728, the mines of Zacatecas yielded $1,800,000 annually, which was then estimated at one-fifth of the entire silver coinage of New Spain.

In the year 1803 the average annual production of the precious metals amounted to $20,000,000 of silver, and only $5,600 of gold. During the War of Independence the quantity of metal extracted from the gold and silver ores was greatly diminished. Humboldt states in his great work on New Spain that two-thirds of the silver supply of the whole world was annually shipped from the port of Vera Cruz, between the years 1800 and 1812. Some silver was also sent abroad from Acapulco. At present the yearly exportation of silver to Europe is valued at about $18,000,000.

Up to the year 1875, it is said that the mines of Mexico had yielded fifty-eight per cent. of the stock of silver thus far produced in the entire world. The value of this amount is equal to $3,700,000,000.

We should remember, however, that some of these mines are now on American soil, *e. g.*, those of California, Nevada,

New Mexico, and Arizona. The yield of silver for 1882 can be roughly estimated at $28,000,000, while that of gold amounts to about $1,000,000.*

The supply of silver in Mexico is now derived chiefly from the mines of Guanajuato, Zacatecas, Sombrerete, Catorce, Pachuca, Bolaños and Batopilas. Gold generally occurs in small quantities with the silver ores. But most of it is lost in the process of reduction.

Perhaps the two most remarkable argentiferous veins of North America, excepting the famous Comstock Lode of Nevada, are the *veta madre* of Guanajuato and the *veta grande* of Zacatecas. These veins have been worked for about three hundred years. The region adjoining these mining towns is an elevated desert, similar to the environs of Virginia City in Nevada.

Although silver-bearing veins at present constitute the most valuable part of the mineral wealth of Mexico, we should not forget the numerous deposits of iron, copper, lead, tin, coal and petroleum, which are found in the country.

Next to argentiferous deposits in importance are the immense beds of iron, which consist principally of the oxides called magnetite and hematite. The well-known *Cerro del Mercado*, in the State of Durango, has been computed to contain sixty million cubic yards of iron ore, having a specific weight of five billion quintals. This metallic mass is valued at $10,000,000,000. An analysis of this ore by Mr. M. H. Boye, of Philadelphia, Pennsylvania, gave 66 per cent. of pure metal. There are other vast hills of iron

* The production of the mines of the United States for the fiscal year ended June 30, 1883, was $47,000,000 of silver and $32,000,000 of gold, given in round numbers.

in Sonora, near Coalcoman, in Michoacan, and in the central part of the State of Oaxaca.

Lead ores, usually in the form of galena and oftentimes argentiferous, are abundant throughout the country. Copper, either native or as oxide, carbonate or sulphide, is mined at various localities in Chihuahua, Oaxaca and Lower California, at the towns of Mazapil and Jalapa, and near the volcano of *Jorullo.*

The oxide of tin is found in veins and alluvial beds at Durango. Mercury, which is usually in the form of cinnabar, occurs in several portions of the Republic.

There are beds of coal in various parts of Mexico. The most important deposits are found in the States of Oaxaca, Hidalgo, Puebla, and Sonora, and on the Rio Grande, near the town of Piedras Negras. A rich quality of anthracite coal is mined on the Yaqui River in Sonora. It contains ninety per cent. of carbon. I may say that few varieties of coal in Pennsylvania are equal to that of Sonora in richness. Lignite, or brown coal, is abundant throughout the Republic. It is worthy of remark, that the discovery of an extensive mine of coal near the City of Mexico, would be of far more value at present than one of gold.

As regards the cost and methods of mining in Mexico, it may be said, that the art has not yet attained the high degree of perfection known in Europe and the United States. Humboldt stated, in the year 1803, that subterranean geometry was mostly unknown, and that the means of communication between contiguous mines were badly arranged. Millions have been expended in developing the mineral wealth of Guanajuato and Zacatecas. It is said that the Count de Valenciana dug three pits in a single mine near the former city at the cost of $1,700,000.

Owing to the low price of labor and the very economical methods of the natives, more can be accomplished for a given amount of money at present, by working the metallic mines on the old Mexican plan, than by the modern and improved system. There are few shafts in the Mexican mines that have been sunk to a greater depth than 1,000 feet. *Malacates*, or large horse-whims, are substituted for steam hoisting works. Instead of using steam pumps, the water which accumulates at the bottom of the pits is raised in large skins attached to ropes, or carried up the ladders in leathern bags by native porters.

I have seen peons in the mines stooping like beasts of burden while carrying pieces of ore weighing as much as 200 pounds on their backs, from the "heading" of a level to the main shaft. The levels are not usually of sufficient dimensions to enable a man to walk erectly in them. The shafts of the mines are generally used only for hoisting the ores, which are placed in huge baskets.

The peons descend into the pits by means of massive stone steps that have been used for ages, as in Guanajuato, or by a series of short ladders as in Zacatecas and other mines on the northern plateau. On leaving the silver mines each peon is searched, as fragments of the precious metals are oftentimes concealed under his arms and in his hair or clothing.

For the last three centuries the *patio*, or cold amalgamation process of reducing silver ores, has been employed in Mexico. This method consists in pulverizing the ore in *arrastres* and mixing it with mercury, salt and sulphate of copper, after which the silver is separated by means of sublimation. This system can only be adopted, however, where water is to be had, *i. e.*, in the vicinity of a stream.

Owing to the high price of fuel, the *patio* process is more economical than the modern methods of reducing the silver ores.

The mines in Mexico belong to individuals. If abandoned, however, they revert to the State. In order to hold a mine the owner is required to work it during four consecutive months of the year. Should the proprietor neglect to conform to the law, the mine is "denounced," and is soon advertised for sale.

With the exception of the ores of silver and iron, no mineral found in the country will be of more importance in future than petroleum. There are extensive oil wells near the east and west coasts of the Republic, as well as on the table-land. It is the opinion of experts that these wells are of equal richness to those in Pennsylvania.

There is abundant petroleum in the Republic, not only for home consumption, but also for exportation to Europe. Instead of importing in future one and a half million gallons annually from the United States, Mexico will soon cease to consume a single gallon of the American product. It is highly probable that New Orleans, Galveston, and other cities on the Gulf of Mexico, will, at no distant day, be supplied with oil from the State of Vera Cruz. At the time of my visit several oil-refineries were in course of erection near Tuxpan in Northern Vera Cruz. On account of the scarcity of bituminous coal, petroleum must needs be employed in the illumination of the houses of Mexico.

The electric light has been adopted on the main streets of several of the larger cities, but of course it cannot be recommended for universal use.

Many guano islands are found in the portions of the Gulf of Mexico bordering on Yucatan. They are numerous in the northern and eastern parts of the Bay of Campeche. A

concession to work these valuable deposits of fertilizers for the term of fifteen years has been granted to a company known as the Transatlantic Association, in which the controlling interest is jointly held by American and British capitalists.

Among the most important and valuable of the industries of Mexico in the near future will be the raising of domestic animals, including horses, mules, horned cattle, sheep and goats. As herdsmen the Mexicans are not surpassed by any other people. While a large portion of the great plateau is not susceptible of profitable tillage, this region is admirably adapted to grazing.

Owing to the mildness of the winters, the animals do not require to be housed nor fed during any season of the year. These conditions apply to the Northern States, comprising an area of not less than 200,000 square miles. About two-thirds of this immense tract affords excellent pasturage. The remainder consists chiefly of mountain and desert, which, however, are interspersed here and there with small sections of farming land.

A few Americans and Englishmen have recently established extensive ranches in this part of the country, where land is to be had at very low prices, and in tracts of almost unlimited extent. Artificial tanks or ponds are used for supplying the live-stock with water. The Mexican cattle are descended from the fine stock brought from Spain at an early period—perhaps soon after the conquest of the country. They are hardy, prolific, and are highly esteemed by the American drovers.

According to the Hon. W. P. Sutton, the American Consul-General at Matamoros, the number of cattle in Northern Mexico may be roughly estimated at six and a half millions, as follows:

Goats	2,500,000
Neat cattle	1,500,000
Horses	1,000,000
Sheep	1,000,000
Mules	500,000
Total	6,500,000

Intimately connected with the growth of Mexico is the system of railroads which I will now describe.

The great desideratum in Mexico has always been cheap and rapid transportation. Excepting a few wagon roads connecting the chief cities, trade between the seaboard and the interior has heretofore been carried on by means of pack animals.

Owing to the very small number of navigable streams, and the vast wealth of her mineral and vegetable products, Mexico offers exceptional facilities for the successful operation of railways.

The Liberal Party in Mexico, which have recently come into power, believe that the development of the immense resources of the country can only be accomplished by the construction of railroads. Accordingly, having but little public land to grant for this purpose, the Government pays subsidies in order to encourage both natives and foreigners to build railways. These subventions, as they are called, vary from $10,500 to $15,300 per mile, and are supposed to amount in the aggregate to about one-third of the cost of the roads. They now reach a total of about $7,000,000 annually.

The plan of building railways in Mexico has been to work from each end toward a central point. This method proved very expensive to the Mexican Railway, but it is nevertheless found expedient to adopt it in the construction of the American trunk-lines. The latter rarely pass through the cities and towns along the route, as the inhabitants prefer to keep the railroad track at a considerable distance; for

example at Monterey, the station is one and a half miles from the city.

With the exception of the Mexican National Railway and the Morelos Railway (the latter being owned by Mexicans), the American standard gauge of four feet eight and a half inches has been adopted on the principal lines of the country. These two roads are constructed of the narrow gauge (*via angosta*), which is thought to be well adapted to the wants of the region traversed by them.

With the railroads, constructed and controlled by American enterprise and capital, will come two all-important benefits: first, improved processes in agriculture, mining, manufactures, and every other branch of the industrial arts; second, cheap transportation which, by leaving to the tiller of the soil and to the toiler in the mines an increased share of the fruits of his industry, cannot fail to elevate his social, intellectual, moral, and political condition.

The first line of railroad—that of the Mexican Railway Company, connecting the City of Vera Cruz with the national capital, a distance of 263 miles—was begun in 1837. On September 16, 1869, the branch of this road from Mexico to Puebla, a distance of 115¾ miles, was opened with great pomp and ceremony. Trains commenced running on the division between Orizaba and Vera Cruz on September 5, 1872, and the entire route was completed on January 17, 1873. The cost of this road was about thirty million dollars.

The Mexican Central Railway extends from the City of Mexico in a northerly direction *via* Queretaro, Leon, Aguascalientes, Zacatecas, Villa Lerdo, Jimenez, and Chihuahua, to Paso del Norte, on the Rio Grande. This road connects with the chison, Topeka and Santa Fe Railroad. Short branch lines will be built to the mining

cities of Guanajuato and Durango. The distance from the City of Mexico to the Rio Grande is about 1,200 miles. At present there is an unfinished space of about 100 miles on the main line between Villa Lerdo and Zacatecas. It is believed that the entire route will be completed on April 1, 1884. Another line is in course of construction by the Mexican Central Railway Company from Tampico on the Gulf of Mexico, *via* San Luis Potosi, Aguascalientes and Guadalajara, to San Blas on the Pacific Ocean. This road has been built to a point about ninety miles westward of Tampico.

The Mexican National Railway has two divisions. The main line runs *via* Toluca to Acambaro. At this point the western division extends to Morelia, and thence to Manzanillo on the Pacific, *via* Zamora and the northern side of Lake Chapala. The distance from the capital to Manzanillo is 615 miles. From Acambaro the northern division is continued over the table-land *via* San Luis Potosi, Saltillo, and Monterey to Laredo on the Rio Grande. The last-named town is 820 miles from the City of Mexico. Connection with the port of Corpus Christi, on the Gulf of Mexico, is made by the Texas Mexican Railway (163 miles in length), which is controlled by the Mexican National Railway Company. This company has also a concession for building a road from Zacatecas, *via* Ojo Caliente, to San Luis Potosi, and from the former city to Aguascalientes. The northern division of this railway will be completed during 1885, there being an unfinished section at present of about 300 miles. But a small portion of the western branch has been constructed. Morelia is the temporary eastern terminus, and the track has been laid from Manzanillo to Armeria, a distance of thirty miles.

The Morelos Railway is the only important line which is owned and operated by Mexicans. It extends from the national capital southward *via* Amecameca to Cuautla, a

distance of about eighty miles. The latter town is the present terminus. From this point the railway will be prolonged to the port of Acapulco *via* Cuernavaca and Chilpancingo. Acapulco, which is the finest harbor on the Pacific coast, is about 300 miles from the City of Mexico. A branch leaves the main line at Los Reyes, about eleven miles from the capital, and runs easterly, *via* Texcoco, to Irolo, which is the present terminus. This division will be continued *via* Perote and Jalapa to Vera Cruz.

The Mexican Southern Railroad, of which General U. S. Grant is president, connects at Laredo with the so-called Southwestern Railway System (comprising about 7,000 miles of track) by means of the International and Great Northern Railroad. Beginning at Laredo, this line will run almost due south *via* Mier, Victoria, and Tulancingo, to the City of Mexico, a distance of about 600 miles. The company has the option of constructing branch roads to San Luis Potosi, and to the Gulf ports of Tampico, Tuxpan, and Vera Cruz. Leaving the national capital, the Mexican Southern Railroad will run parallel with the Mexican Railway for about eighty miles, when it trends to the southward toward Oaxaca *via* Puebla, Tehuacan, and Arenal. At the last station a branch line is in process of construction to Anton Lizardo, on the Gulf of Mexico, 142 miles distant. This division will be continued to Vera Cruz, a distance of twenty-three miles. From Oaxaca the main line will extend *via* Ejutla, Miahuatlan, and Tehuantepec, to Tonalá. The road bifurcates at the last place, one branch leading northeasterly to San Cristobal, the other going to Tapachula, and thence it will probably be prolonged to the City of Guatemala. Not more than five or six miles of track of the Mexican Southern line have been laid thus far.

The New York, Texas, and Mexican Railroad, which is

better known as Count Telfener's * road, begins at Rosenburg Junction in Texas, and will run across the Rio Grande at Matamoros, and thence southward *via* Santander, Tampico, and Tuxpan, to the City of Mexico. Branch lines will be extended eastward to Soto la Marina, and westward to Victoria in the State of Tamaulipas. No portion of this road has yet been completed.

The Mexican International Railroad extends from Piedras Negras on the Rio Grande southward *via* Sabinas to Monclova, and thence across the so-called "laguna country," toward the Mexican Central Railway. A junction will be made with the latter line in the vicinity of Lerdo. This road is in operation between Piedras Negras and Monclova. An iron bridge crosses the Rio Grande at the former town, where connection is made with the Galveston, Harrisburg and San Antonio Railroad.

The American and Mexican Pacific Railway begins at Topolobampo Bay and, traversing the States of Sinaloa, Chihuahua, and Coahuila, ends at Piedras Negras. The company has the right to extend branch lines southward to Mazatlan and northward to Guaymas. The work of construction has not yet been commenced.

The Sonora Railway connects with the Southern Pacific Railroad at Benson in Arizona. From this point it runs southward to Nogales on the Mexican frontier, and thence *via* Magdalena and Hermosillo to the port of Guaymas—a total distance of 353 miles. This line was completed on November 25, 1882.

It may be remarked, that with the exception of the Morelos Railway, all of the lines thus far described extend from the United States toward the heart of Mexico, while one road (the Mexican Southern) is projected beyond the capital into

* Count Telfener is an Italian capitalist.

Guatemala. A few other railways are in process of construction in Southern Mexico and Yucatan. Among them may be mentioned the following roads:

The Tehuantepec Railroad, which commences at the mouth of the Goatzacoalcos river, and will run almost due south to Salina Cruz on the Pacific. The line will be about 190 miles long, and its completion will bring about formidable competition with the Panama Railway, especially as regards passenger traffic. Beginning at the northern terminus about thirty miles of track have been built. It may be said that the commercial advantages of a means of communication across the Isthmus of Tehuantepec either by land or water can hardly be overestimated. While the commerce between Europe and the Pacific Ocean will be carried on *via* the Isthmus of Panama for many years, the greater part of the trade between the Atlantic and Pacific coasts of the United States must needs be conducted across the Isthmus of Tehuantepec as soon as the railway is finished.

Several railroads are in course of construction in the State of Yucatan. A line has recently been built from the port of Progreso to Merida, the capital of the State, twenty-two miles distant. Three railways are projected from Merida; toward Valladolid on the southeast, to Peto on the south, and toward Campeche *via* Calkini, on the southwest. About 100 miles of track have been laid thus far on these three lines.

Charters have been granted by the National Government for the construction of various other lines of railway, but the date of their completion is so remote that I will not mention them here.

On January 1st, 1884, about 3,000 miles of railroad were in operation in the Mexican Republic. The concessions made to American capitalists alone amount in round numbers to 13,000 miles.

IN MEMORIAM.

PETER COOPER.

MEETING MONDAY, APRIL 16TH, 1883, AT 8 P. M., AT CHICKERING HALL.

ADDRESS OF CHIEF JUSTICE DALY.

LADIES AND GENTLEMEN: This evening, or the first part of it, is to be devoted to a memorial meeting on the death of Peter Cooper. We have felt that this tribute to the memory of Mr. Cooper is due from the fact that it is to him chiefly that we owe the preservation of this Society.

After twelve years of laborious effort from our formation in 1854, we found our resources so inadequate as to be unable to go on with the affairs of the Society. There appeared to be nothing to do but to disband it unless we could infuse new life into it, and one of its vice-presidents, Judge Bradford, and a very earnest member, expressed the opinion that it was not possible to establish a Geographical Society in this country—that it could only be done in Europe. Some of us were not of that opinion, and among those was Mr. Cooper, one of our oldest members. At his suggestion and upon his offer, the Society was removed to the Cooper Union, where apartments were furnished it gratuitously. A library-room, filled with book-cases put up at his cost, and a room for our lectures was given to us, which were then quite adequate to our wants. Many other advantages were supplied entirely free of expense, and we enjoyed those advantages for a period of ten years, to which, in my opinion and the opinion of my associates, was largely due the future prosperity and present stability of the Society. It is, therefore, but a proper

acknowledgment for benefits received, that we should at this memorial meeting express our sense of what we owe to Mr. Cooper and our respect for his memory. The interest taken in him in this city was so widespread, that nearly everything connected with his life and history has been recently presented in the public journals. Yet I cannot allow this occasion to pass by without saying something myself, for I knew him personally for more than forty years, and during the principal part of that time intimately. I knew of him from my boyhood. What most impressed me during my long and familiar acquaintance with him was the uniformity of his character. He was always the same man in mind, character and to me even in personal appearance. Forty-seven years ago, ten years before the Cooper Institute was founded, a very distinguished Unitarian divine of that day, who was Mr. Cooper's pastor, the Rev. Orville Dewey, delivered a sermon on the great fire of 1836. In referring in this sermon to the great destruction of property, he expatiated upon the value of wealth and the uses made of it, and drew this portrait of Peter Cooper:

"But, again, I went forth, and another man I saw, and "he, too, was opulent; but I saw that he grew modest, "not proud, and beneficent, not voluptuous, with his in- "creasing wealth. I saw, too, that in the midst of all the "splendors and comforts of ample fortune, he bowed in "humble gratitude before the great Giver of all blessings; "and I saw, too, that his abundance flowed forth in many "streams of beneficence to the world around him; that he "was the poor man's friend, and the young man's patron "and adviser, and the generous protector of his kindred, "and the liberal fosterer of science and learning, and the "noble helper of many charities; and then it seemed to

"me that wealth was a good and beautiful thing—a "blessed stewardship in the service of God, and a divine "manifestation of mercy to man."

Nearly half a century has passed by since that sermon was delivered, and the same portrait substantially has been drawn to-day in the obituary notices by nearly every journal in New York. Mr. Cooper was no respecter of persons. No matter who the man was, how distinguished, influential or poor, his manner to all was the same. With his high intelligence, his large business capacity and his great activity, he had under all circumstances and in all situations, a childlike simplicity of character, which he never lost to the end of his long life. He had the unusual combination of qualities that led to the constant accumulation of wealth and to the intelligent distribution of it. He died leaving a fortune of $2,000,000, and he gave away during his life for benevolent and scientific purposes more than $4,000,000. "I have recognized," he said, "that the object of business is to make money in an honorable way. I have therefore been always ready to engage in any new enterprise where I could do so without incurring debts; but I have also always recognized the fact that the use of money is to do good"—and in these few words he has written his own epitaph. When we remember, ladies and gentlemen, that the habit of accumulating wealth usually leads to the habit of holding on to it, we will recognize how marked an exception he was in this respect. When I first knew him he was about fifty years of age. I, therefore, saw him as he grew old, and in growing old he differed from any man I ever knew, for he maintained to the end of his life the most youthful mind of any man of his years with whom I ever came in contact. Most men

when they grow old, become indifferent to the present and live chiefly in the memory of the past. He was an exception. I had a long conversation with him three weeks before his death, and his mind was as active as when I first knew him. He showed the greatest interest in circumstances that were then transpiring, and his forecast in respect to the future was especially noticeable. That he was thus ever young and his mind ever fresh was the result of what he often said, that he never felt himself too old to learn. He lived throughout a remarkable development of the world's history and especially of this country. In the year in which he was born, 1790, the population of this city was a little over 33,000. It is now over a million. The population of the United States at that time was something over four millions; it is now fifty millions; which sufficiently indicates the eventful period through which he lived and the changes he witnessed—developments of which he was always a most intelligent observer and in which, to a considerable degree, he was an active participant. I was present on one occasion when a reception was tendered to him, and in the course of some remarks he stated the lesson of his long and observing life in these words: "My experience of life has not dimmed my hopes for humanity. My sun, therefore, is not setting in clouds and darkness, but is going down prayerfully and with faith in God"; a statement as true as it was beautiful and poetical. He said to me once that he was very much impressed with the conversation of a gentleman who had been in Paris, who gave him an account of the Polytechnic School there, and he said, "I thought the most useful thing I could do was to found an institution where those who have to live by their daily toil might find the means after their labors

were over in the evenings to educate themselves if they felt disposed"; a conviction he carried out by founding the Cooper Union. He kept there at all times of the day a scientific man to give practical information to any one who called. But time will not admit of my saying all that might be said about him, and I will simply say in conclusion that he has set an example to the youth of this country in his life and character which is worth more than any other teaching—the experience of a virtuous, intelligent and public-spirited citizen who acquired all the wealth that in this world is worth having and distributed it in a way which makes wealth worth possessing.

ADDRESS OF JUDGE RICHARD O'GORMAN.

LADIES AND GENTLEMEN: So much has been said—well and eloquently said—here and elsewhere, in testimony of the great reverence which all people in this city entertain for the late Peter Cooper—the features of his character are so clear and so well known to all, that, but for the invitation of your President, I should have thought that any word from me here to-night would be out of place.

Even on his invitation, I shall say but little. For a man to have borne himself for ninety-one years, through all the vicissitudes of a busy life, not only without stain, but with universal respect and approval—to have left behind him, when he died, a whole city in mourning for his loss, and honoring his memory with every manifestation of real sorrow—this is a rare achievement, and should be marked with peculiar and distinguished honor.

The life of Peter Cooper was a simple life—very unostentatious and unpretending. As healthy and vigorous plants

grow from bud to blossom and flower to fruit, so from his early days he grew in energy, and success, and wealth, and power, and usefulness, by the innate force of his own integrity and benevolence; and as he grew, he acquired, year after year, larger knowledge and more perfect skill in the blessed science of doing good, and year by year he put that science to uses of broader and more comprehensive philanthropy.

Old age came and found him in the midst of his labors, still striving with practical sagacity to serve his fellow-men, and when at last death laid its hand upon him, it was but to lead him gently from accumulating public services and accumulating honor to the natural and necessary hour of repose.

It is hard to imagine a life more graceful, more fruitful, more happy, or a death more peaceful and serene.

The career of such a man is an honor to the city in which he was born.

Peter Cooper was born in New York. He loved it and its people, and they loved him in return, as one of themselves—as a fit representative of what was best among them, and deeper even than their regret at losing him are their pride of his eminence in worth, and their gratitude for the real and substantial good he has done them.

Your worthy President has told you how the idea occurred to Peter Cooper of the admirable institute of learning, in this city, which bears his name. His purpose was to help the poor, by teaching them how to help themselves—by placing within their easy reach the means of acquiring knowledge of various handicrafts—of various useful occupations, in which they could earn honest bread by honest labor. The Cooper Institute is a great polytechnic school, where the artistic tastes and quick inventive instincts of

this people are being educated into full and successful development. It has done and is doing incalculable good. It was a great work, well planned, well carried out, by a clear head and a generous heart.

Peter Cooper, wiser than others, did not leave to other men to mature his projects after his death—he carried them out himself—he watched himself over their growth and development. He lived to see them prosper. He lived to see thousands of men and women, who had by his aid acquired skill in many lucrative trades—who had raised themselves by industry into honest independence, living lives active, productive, useful, dignified and happy, who but for him seemed doomed to mere hopeless, monotonous, unintelligent, unremunerative toil.

We hear men speak of regal splendor, of royal munificence. If it be indeed royal to be benevolent, then was Peter Cooper a true king among men,—ruling by a title against which there is never conspiracy, or treason, or revolt.

Our newspapers are asking what shall be the public monument most fitting to do honor to the memory of Peter Cooper. Shall it be statue of bronze or marble, so that in days to come, men may know the features of the man who loved the people and whom the people loved? Such a monument would be, no doubt, right and proper. But there is another kind of monument which, as it seems to me, would better serve to keep his memory green in men's souls. Accept his ideas, continue his good work—expand it, and extend its usefulness.

We have citizens as opulent as he was, as eager, no doubt, to do good; let some of them take his place, fill the vacancy his death has made, catch the inspiration of his thoughts and carry them into fuller and broader develop-

ment. He was the pioneer. Let others tread the pathway he traced for them to follow.

There is room for a larger "Cooper Institute," and for more of the same kind. When that edifice was built, New York was comparatively a small city; now it is a great metropolis, with a teeming population—the largest manufacturing city of the world.

There is in it, great accumulation of wealth; there should be also great accumulation of projects of large and practical philanthropy.

There is great need of free schools for the technical education of our people.

In this, our common schools are, I fear, deficient, and the result is a supply of men and women, trained for merely intellectual occupations alone, and the supply far exceeds the demand.

Of polytechnic institutions, like that which bears the name of Peter Cooper, there should be not one alone, but many, in this city, and in all the great cities of the Union, and these would be the most effective public memorials of the public benefactor.

In old times, great wealth was proud to display itself in splendid munificence, and the jealousy that sometimes follows great wealth lost half its bitterness in the general enjoyment that this munificence diffused. Men saw and felt that wealth is not of its own nature selfish—that it can be put to generous use and serve great public ends.

Then, private benevolence even took thought for the amusements of the people, and public gardens and parks, and galleries of pictures—the free gifts by private citizens for public use and recreation and amusement—attested the mutual sympathy, the firm bond of good fellowship, that held together in mutual good-will, the rich and the poor.

So will it be here. These things will come in time. This city, gifted as it is with all natural advantages, will grow in beauty. It will be the head as well as the heart of a whole continent. What other cities were of old, New York can be, if it will—the chosen home, not alone of wealth and luxury and of great commercial activity and success, but the home also of scholarship, of artistic excellence and intellectual grace and enjoyment; and when, in days to come, men shall see all these projects and triumphs of the future accomplished, when they shall see many edifices such as that which our departed fellow-citizen inaugurated, diffusing useful practical, fruitful knowledge and skill among all the people, giving light and life and happiness; then if they chance to ask, how did all these things originate, who first planned them, who first caught the generous idea and taught it to others? some one will answer thus: Since the man to whom we owe these benefactions lived and died, long years have passed away, yet he is still remembered with gratitude. He was in his day rich, benevolent, wise and sagacious in his way of doing good. To him we are indebted for the first step in this great diffusion of civilization and comfort and happiness, and the name of that good man was "Peter Cooper."

GENERAL VIELE'S ADDRESS.

The saying that a man shall be known by his works applies, perhaps, more distinctly to Mr. Cooper than to any other of his countrymen.

I will detain you but a few moments while I refer briefly to some good works of his that have borne lasting and abundant fruit, but for which the world hardly realizes its

great indebtedness to him. There was a time in the history of this country when there was no organized effort to restrain the pestilence or protect people from the ravages of disease. When the great increase in the death rate caused serious alarm among all thinking citizens, and the absence of any preventive measure made it necessary that some steps should be taken to preserve us from the calamities of a wide-spread epidemic, Mr. Cooper with others organized an Association known as the New York Sanitary Association for the collection of vital statistics, and the diffusion of information, with the view to laying the foundation for suitable laws that would create a barrier against the ravages of disease. I will read a paragraph from the report of the Association made at that time. It was written a quarter of a century ago; yet all the results anticipated have been more than realized:

"This is but the *commencement* of labors for the promotion of sanitary improvements and the advancement of sanitary science. The rich fruits of such labors, we hope and believe, are to be enjoyed hereafter by entire communities; but in a peculiar and a very practical sense it will be found that the laborers for the health and happiness of their fellow creatures will *themselves* be rewarded with personal and social benefits that they did not directly seek. He that promotes the health and happiness of his fellow men is doubly blessed, for by the same means that he employs to benefit his fellow beings, he becomes prepared to appreciate and promote his own and his family's welfare; and also as a natural consequence, in his philanthropic labors to protect and benefit his neighbor, however poor or degraded, he becomes benefitted and protected in return. Illustrations of this truth will readily oc-

cur to every mind. Human society is full of evidences that—

> 'The quality of mercy is not strained;
> It droppeth as the gentle rain from heaven
> Upon the place beneath; it is twice blessed;
> It blesseth him that gives and him that takes.'"

Heading the list of that Association was the name of Peter Cooper. That was the beginning from which our present health organinzations started. He lived to see the organization of boards of health in every large city of the United States, and also a National Board of Health under the General Government. The public and private beneficence that has resulted from his early labors in this cause cannot easily be estimated. Again, there was a time in the history of this country when the only fuel that was used was fuel from the forest. A man who assumed to have discovered stones in the earth that would burn, was laughed at and ridiculed, and, having sold some of these combustible stones in the City of Philadelphia, Pa., was arrested for obtaining money under false pretenses; but that was the discovery of anthracite coal. It was found, however, that it could not be used for any practical purpose in the absence of methods for burning it. The active and practical mind of Mr. Cooper conceived a method by which it could be turned to account, and he will go down to history as the inventor of the use of anthracite coal. Of all the branches of industry that have been developed during the last century none has produced larger results than the use of anthracite coal, of which the last annual production was 30,000,000 tons against 300 tons the year Mr. Cooper invented its use. These are but instances of the far-seeing and earnest efforts of Mr. Cooper in behalf of his fellow-men. And so long as there is a power

in the human tongue made eloquent by truth, so long as there is tenderness in the human heart made pure by patient suffering, so long as there is courage in the human soul made firm by faith, so long will his virtues be extolled, his name respected and his memory revered among men.

I offer for your adoption the following resolutions:

RESOLVED.

That by the death of Peter Cooper this Society has lost one of its oldest members and its greatest benefactor. That twenty years ago, when the resources of our Society were found to be inadequate to maintain it, its preservation was due to Peter Cooper and the Trustees of the Cooper Union providing capacious apartments for its library, with a lecture-room for its special use and other accommodations, free of expense, from 1865 to 1875; during which time it was enabled, being free from all pecuniary embarrassment, to enter fully upon its purposes and objects, to resume its publications, to greatly increase its library, to augment its membership from about 200 to 1,000 fellows, and upon leaving the house so long and generously provided for it, to enter into the possession of a house of its own. Mindful of all the good that has been accomplished by Mr. Cooper in his life-long devotion to the best interests of humanity—and of all that will yet be accomplished in the years to come by the noble influence he has left behind him—this Society acknowledges its deep sense of the obligations due to him and expresses its respect and veneration for his memory as of one who revered God and loved his fellow-men more than himself.

Resolved, That in token of our respect and esteem this Society will cause the portrait of Mr. Cooper to be painted and placed in the rooms of the Society.

THE POLITICAL GEOGRAPHY OF EGYPT.

BY

LIEUT.-GENERAL C. P. STONE.

MR. PRESIDENT, LADIES AND GENTLEMEN:

I esteemed it a very great honor that, almost as soon as I touched the shores of my native land, after an absence of thirteen years in Egypt, I received an invitation from our Society to speak this evening on that country.

The invitation was accepted with thankfulness. But here, at the outset, appears before me one of those striking contrasts which exist between the East and the West.

Mr. President, in Egypt I was one of your colleagues. I was there president of a Geographical Society, and presided over many of its public meetings. Yet never, in one of its meetings, did I see before me in the audience a lady of the land. There, no orator ever had such cause of inspiration, or nervousness, as the case may be. Here, honored as this meeting is by the presence of so many of our countrywomen, how different it is!

But our American ladies must not think that, because their Egyptian sisters have not the privilege of attending the public meetings of a scientific society, they possess no rights special to them. Oh, no! they also have rights and privileges, some of which our countrywomen do not possess.

Here, in New York, suppose one of the so-called "lords of creation" entering his house. As he passes the door of his wife's reception-room, he hears within the clink of china and silvery sounds of feminine laughter. Aha!

Madame has lady friends with her! and straightway he stalks unannounced into the sacred presence. It is his right to enter his wife's reception-room; and no matter what nice bit of gossip, what pretty little feminine secrets may be under discussion, he must be received by all with smiles, as if of welcome.

But not so in the East. There, suppose one of these same so-called lords of creation entering his house. The silent servants bow low as he makes his way towards *his* wife's reception-room. As he approaches the heavy curtain which closes the entrance to what in his language is called "the abode of bliss," *he* hears echoes of silvery laughter: *he* hears the clink of china. Aha! his wife and daughters are taking coffee! he will join them. The aroma of his best tobacco comes past the curtain to his nostrils. Aha! the ladies have their chibouks and cigarettes! He will join them in that, too. The sound of music comes to him, and the clack of castanets. Aha! the ladies have the musicians and the dancers before them. Good! he will enjoy these with them. He steps nearer the curtain to raise it and enter; but a sight meets his eye which brings him instantly to a standstill, and then turns him away. Three or four, or, perhaps, a dozen pairs of tiny outside slippers lie before the curtain. That is all; but that is quite enough to arrest his course. He knows by this simple sign that his wife and daughters are entertaining lady visitors, and he may not enter until they shall have departed. All the rest of his establishment is at his disposal—*salaamalek*, billiard-room, garden, and all; but until that little coterie shall be pleased to break up, and the tiny slippers shall retire, his "abode of bliss" is closed to him.

So much for contrasts.

Do not think, Mr. President, from the title of this address, "The Political Geography of Egypt," that I intend to impose on the Society a long, dry story of dozens of dynasties of old Pharaohs—of what Rameses did, or Seti did not do, in changing the political conditions of Northeastern Africa. All this has been told a thousand times by men far more able than I; and in the rich library of our Society all this may be found. But I have thought that I might presume to occupy an hour of your time in a discussion of the changes which have taken place in that ancient country during the short space of time in which the Government of the United States has existed in this, our own beloved country.

To begin, then, at the time when Washington was first elected President of the United States. Egypt was then, as now, *nominally* a possession of the Ottoman Sultan. *Really* it was ruled by a few Mameluke Beys, who apportioned out among themselves the rich lands, the villages and the populations of the country, and worked them all mercilessly to keep up their respective little courts and maintain that splendid cavalry whose exploits are known to the whole military world.

In 1798 a great figure appeared on the scene. Napoleon Bonaparte, member of the Institute of France, General-in-Chief of the expedition to Egypt, landed at Abousir, a little to the westward of Alexandria, with 40,000 men, veterans of his Army of Italy.

In a few days he had occupied Alexandria. In a few weeks he had met and overthrown the united forces of the Mameluke Beys, and had occupied "Cairo the Victorious." In a few months every vestige of Mameluke power had disappeared, and Egypt in its length and breadth acknowledged the sway of the French Republic.

I need not weary you with any words on the work of Napoleon in Egypt. It is set forth in that magnificent work, *La Description de l'Egypte*, prepared by the most brilliant corps of *savants* ever sent forth by any government, and forming the most beautiful of the great soldier's monuments.

In the first year of the present century disinterested England joined her forces, naval and military, to those of Turkey in a campaign against the French in Egypt, and the isolated remnant of the French army was forced to evacuate the country, leaving it in the hands of the Sultan's officials.

The extent of Egyptian territory which, during the first few years of the nineteenth century, was *de facto* under Turkish rule, extended from El Arisch on the east to a little beyond Alexandria on the west, and from the sea coast on the north to near the first cataract on the south; and this territory paid an uncertain revenue to the Sublime Porte of about £4,000 per annum.

Then appeared on the scene a second great figure, Mehemet Aly, the founder of the present dynasty, which dynasty has wrought such changes in the political geography of Northeastern Africa as have been rarely seen on any continent in the same space of time.

When Mehemet Aly, in 1805, seized upon the Viceroyalty of Egypt he could rule more or less completely over a narrow strip of country along the Nile of about nine degrees of latitude in length, and of an average width of about four degrees of longitude.

Seventy years later his fourth successor, his grandson, the Khédive Ismaïl, ruled absolutely over a territory of thirty degrees of latitude—from Damietta on the north to

near Urundogani on the south, and from Cape Guardafui on the east to the frontiers of Wadai on the west. And Egypt paid regularly to the Sublime Porte a tribute of nearly four millions of dollars! The Egypt of the old Pharaohs was all under his sway.

Let us pass in review rapidly the changes as they occurred.

Hardly had Mehemet Aly seated himself as Viceroy of Egypt when he energetically pushed toward the south to assert his power as far as the first cataract, between which point and Cairo the Mameluke Beys recommenced their disastrous rule. While he was actively engaged in this operation disinterested England again moved upon Egypt, this time (1807) sending a force of five thousand soldiers to overthrow the new Viceroy and replace him by the Mameluke Elfy Bey.

British history does not enlarge upon the Summer campaign of 1807 in Egypt, but the Egyptian and some French histories do. Suffice it here to state, that the genius and energy of Mehemet Aly foiled and completely defeated the combination of British, Mameluke and Bedouin troops, and left him in full possession of all Egypt proper, that is, from the Mediterranean coast to the northern limit of Nubia.

Fully impressed with the importance to the ruler of Egypt of the possession of the great back country on the south, the great Viceroy persistently employed his forces in that direction; and in 1817 he had conquered all Nubia, Kordofan and Senaar; ruling on the Nile from latitude about 32° to latitude 12°.

Before his death, which occurred in 1848, his power was recognized south on the White Nile, to latitude 5° N., and he had personally commanded an expedition up the Blue

Nile to Fazouglu, where he established his advanced post in that direction.

The immediate successors of Mehemet Aly, his son Ibrahim, his grandson Abbas and his son Saïd during their reigns, did not add to Egyptian territory on the south; but under the latter two the Egyptian power was made firmer among the tribes along the Abyssinian frontier.

During the reign of Saïd Pacha, Captain Speke made his discovery of Lake Victoria, the great reservoir of the White Nile, and clearly indicated the position and extent of Lake Albert. Later, Sir Samuel Baker, acting on the indications of Speke, visited and described Lake Albert.

These discoveries of the headwaters of the great Egyptian river, were of vast importance to Egypt; and their importance was fully appreciated by Ismaïl, the successor of Saïd, who came to the throne in January, 1863. From the day of his accession he fostered the Soudan, and in 1869 he gave to Sir Samuel Baker the command of a large force and almost unlimited means, and sent him to occupy and organize government in the region between Gondokoro and the equator.

The history of Sir Samuel Baker's expedition as Pacha and Governor, and its results, are well known to the Society. The advanced military posts of Egypt were, in 1873, when Baker Pacha returned, in Unyoro between lakes Albert and Victoria; and Gondokoro was the capital of the Egyptian "Provinces of the Equator."

In this same year of 1873, the Bahr-el-Gazall country was occupied as an Egyptian military province with its capital at Shekka.

In 1873 took place, also, the occupation of the port of Beberah on the Gulf of Aden, and within three years it

became a civilized centre, with lighthouse, post-office, hospital and warehouses, while the Khédive's flag was planted and maintained beyond Cape Guardafui, down to Ras Hafoun on the Indian ocean.

The occupation of the Province of the Bahr-el-Gazall resulted in the conquest of the Empire of Darfour in the following manner:

The Emperor Ibrahim of Darfour, who derived a large revenue from the traffic in slaves that he captured in Dar Fertit and the Bahr-el-Gazall country and sent in caravans to Egypt, Tripoli and Tunis, was, in 1873, warned by the Khédive Ismaïl that those countries, having come under his rule, must henceforth not be entered by the troops of Darfour for the purpose of capturing slaves—and was informed that the Egyptian commander at Shekka had received orders to prevent slave raids in those regions. At the same time that this warning was given, a small body of regular troops, armed with Remington muskets, was sent there to enforce the warning, and the bands of native and half-breed slave-catchers in the territory, whose occupation was also taken from them by the prohibition of the slave trade, were, to the number of several thousands, taken into the Governor's service and allotted pay and rations to recompense them for their abandonment of occupation.

The Emperor Ibrahim, neglecting the warning, sent a strong force into the Bahr-el-Gazall country, and finding the garrison of Shekka in its way, this force attacked the place. The result was a disastrous defeat of Ibrahim's troops.

He was again warned by the Khédive, and informed that, should he repeat his raids, the southern province of Darfour (Dara) would be occupied and annexed to Egypt as a matter of security for the future.

Despising this warning, Ibrahim sent his Grand Vizir, at the head of ten thousand men, to attack Shekka again. The result was defeat and the occupation of Dara.

Again he was warned and informed that should he molest the Khédive's forces in Dara his whole country would be occupied—and as he despised this warning and attacked Dara, his country was, in 1874, completely occupied, he himself falling killed in the last battle which occurred.

This conquest of Darfour added an empire of territory to the great back country of Egypt, and several millions of subjects to the Khédive. It was also the most deadly blow to the interior slave trade in Africa that had ever been struck.

Before the campaign was fairly over, a large corps of staff officers were on their way thither, well supplied with good instruments, and in 1874–5–6 the whole territory of Darfour was well reconnoitered and mapped.

Darfour had previously been visited by only two Europeans. The first was an English traveller, Browne, who, in 1793, managed to gain entrance into the country, from which foreigners were jealously excluded. Once within the country he found it impossible either to travel in the interior or to return to Egypt. He remained there a prisoner in his house during two years and was then fortunate enough to obtain, by petitions and bribes, permission to return to Cairo.

It was from his descriptions of what he had heard in Darfour that European geographers had made up the best maps they could of that country.

Their accuracy may be estimated from the fact that his placing of Kobbé, the capital, on the map was about *one hundred and sixty miles* incorrect in longitude.

The second European who entered Darfour was a French oculist, Dr. Cuni, who was invited thither to exercise his profession in the palace. He found it easy to enter Darfour for this purpose, but he was never permitted to leave, and died there after a prolonged forced residence in the capital.

The Egyptian conquest so changed the country that in 1876 the postal service throughout the country was well performed, and a European traveller could pass everywhere in the land in perfect safety and with considerable comfort, as comfort is understood in the interior of Africa. The telegraph then connected Darfour with Cairo and the rest of the world.

In 1874 Colonel Gordon was invested with the command of the Provinces of the Equator, with his headquarters at Gondokoro, and between his operations and those of the Governor of the Province of Bahr-el-Gazall, the Egyptian flag was carried (1876) down near to the equator on the White Nile, and to include the country of the Niam-Niam on the west of the White Nile, while steamers plied on the Nile and on Lake Albert to keep up communications with and transport supplies for the military posts in Unyoro.

In 1875, the King of Harrar interfering with the caravans coming from the interior to the new port of Berberah on the gulf of Aden, it became necessary to deal with him as with the Emperor of Darfour; and by a rapid campaign conducted by Raouf-Pacha, the ancient kingdom of Harrar was conquered and permanently occupied.

Thus, in a few short years, the Khédive Ismaïl, carrying out the policy of his wise and far-seeing grandfather, added to the map of Egypt territories sufficient for three empires and populations amounting to probably ten or twelve millions.

His conquests were all advantageous to geographical science, for where his troops went, went also the compass and chain, the theodolite and sextant, the telescope and chronometer in the hands of intelligent staff and engineer officers, and maps of hitherto unexplored countries went forth to the world. In remote and hitherto inaccessible regions, or regions which had before been accessible only with great difficulty and danger, such as near the frontiers of Wadai and the countries of the Niam-Niam, Somali and Gallas, were thenceforward to be found hospitable, civilized military posts, where geographical travellers were always welcomed and aided, giving them the great advantage of bases of operations a thousand or fifteen hundred miles from the Mediterranean.

His conquests were all to the advantage of civilization, for wherever his power was established there were established schools and hospitals and facilities for the great civilizer, commerce.

His first endeavor after his troops had occupied a new region was always to improve the material condition of its people. His second endeavor was to improve their moral condition by education.

Mr. President, the great development of Egypt which took place during the past twelve years I saw, and an infinitesimal part of it I was. It was a most fascinating service. Now this is not precisely the place for the discussion of political subjects; but I feel that should I, under present circumstances, fail to speak somewhat of the ex-Khédive Ismaïl I might be supposed to have joined the great army of the ungrateful, and I would not like to have that supposed of me.

Ismaïl Pacha mounted the throne of Egypt on the 18th

of January, 1863. He was then, by inheritance and good management of his large patrimony, one of the wealthiest princes in the world. He found his country, on his accession to power, producing a revenue of about £4,000,000, and with a small debt. He found the Suez canal in the process of construction, but the company being in great financial difficulty the progress was slow and unsatisfactory. He found that concessions had been made by his good-natured and easy-going predecessor to the Canal Company, some of which were very oppressive to his people (obliging them to work on call for the company, at low wages), and some of which (such as rights to acquisition of lands and rights of colonization with exemption from payments of customs duties) were dangerous to the existence of his government. He found the system of public instruction, so carefully organized by Mehemet Aly, neglected, disorganized and nearly destroyed.

He found a short line of railway running through Lower Egypt and connecting the Mediterranean at Alexandria with the Red sea at Suez; but the port of Alexandria open to storms and the port of Suez fit only for the requirements of trade as trade existed in the time of Cleopatra.

He found the country producing sufficient of grain and cotton to supply the wants of the population in bread and to export from three to four millions of pounds sterling per annum.

He found Egypt in possession of only two ports on the Red sea, Suez and Cosire.

He found his country so bound by the treaties between the Christian Powers and the Ottoman Empire that some seventeen different codes of laws in half as many different languages were applied to his people in their dealings with

foreigners living in the country. He found Europeans of every nationality urging improvements in every branch of industry, and each urging that the means of such improvements be purchased in his country.

Endowed with high intelligence, well educated in Europe, appreciating the immense material advantages which his country would derive from the introduction of Western science and its results, princely and grand in his ideas, Ismaïl Pacha devoted himself and all his resources to the advancement of his country.

When, in 1879, he was driven from his throne and his country, not by his own people, but by a combination of European governments, using as a pretext the claims of European bondholders, he had accomplished, among many other great things, the following:

1st. He had delivered his country from servitude to the Suez Canal Company by the payment of many millions of pounds in buying back the dangerous concessions made to the company by his predecessor, and, in so doing, had given to the company the means of continuing and completing that grand work, so useful to all the world excepting only Egypt.

2d. He had so increased the prosperity of Egypt that she produced enough to feed her own people, and yet export more than seventy millions of dollars worth in a year—nearly four times as much as she could export when he came to the throne. The revenues also had increased and more than doubled.

3d. He had covered Lower Egypt with a network of railways and canals which facilitated the transportation of crops and merchandise, secured irrigation and brought a net revenue of three or four millions of dollars a year to his government.

4th. He had gained for himself and his successors the title and rights of Khédive (Tributary King), in place of those of viceroy, held by his predecessors.

5th. He had gained for Egypt the jurisdiction of the whole African coast of the Red sea and gulf of Aden.

6th. He had extended the electric telegraph over all Egypt and over a large portion of the Soudan; and had perfected the postal service and connected it with the Postal Union of the world.

7th. With vast outlay he had bridged the Nile, given to Alexandria harbor improvements of immense importance, and created an admirable artificial harbor with docks, and dry dock at Suez.

8th. He had restored Darfour, the Bahr-el-Gazall country, the Niam-Niam country, Northern Unyoro, Harrar and the Somali country to the dominion of Egypt, and by scientific conquest had given to the world geographical knowledge of greater importance than any other sovereign of his time.

9th. He secured to his country one code of laws and one class of tribunals by which should be adjudicated all questions arising between his subjects and those of Christian Powers and questions arising between subjects of different powers, residing in Egypt; instead of having each nation's consul the judge in all cases in which his countrymen might be defendant.

All these things, and many more, he accomplished during his reign from 1863 to 1879. His enemies who drove him, against the will of his own people, from his throne, have had the opportunity to write the history of his reign in European languages for the moment, and to create public opinion in the Western world to justify the infamous

treatment he received from the governments of Europe. It is meet that here, before the American Geographical Society, a word should now be spoken for one who has done so much for geographical science as did the Khédive Ismaïl.

In the not distant future, when those sovereigns of Europe who, false to their own order, aided in driving him from the throne of Egypt (for the benefit of speculators and the carrying out of England's selfish policy) shall have passed away, history will, I believe, calmly record his good and great deeds, as well as his mistakes, and, when telling of what Egypt was under his rule and what she became under Western rule, will establish his fame as one of the great rulers of the nineteenth century.

THE DUTCH POLAR EXPEDITION OF 1882–3.

This expedition had assigned to it the carrying out of magnetic and meteorological observations at the mouth of the Yenisei, under the command of M. Lamie, a lieutenant in the Royal Netherlands Navy. The vessel, the *Varna*, was lost in the Kara sea in 1883.

STATEMENT OF MR. FRANK RUST, OF AMSTERDAM (HOLLAND), *A Member of the Expedition.*

At the request of the American Geographical Society, I beg leave to make the following statement respecting the voyage of the steamship *Varna*, of the Dutch International Arctic Expedition of 1882–3, which was lost in the Kara sea in May, 1883, and of the Scientific Corps, of which I was a member.

The main object of the expedition was to take meteorological observations, and incidentally to ascertain whether regular commercial communication could be maintained with the Yenisei and the Obi, Prof. Nordenskiöld having expressed the opinion that the Kara sea would be navigable every year in the months of August and September.

In the arrangements made in London, in 1881, between the nations, for permanent circumpolar stations, the representatives of Holland were asked if they would take Port Dickson as a station, and Prof. Buys-Ballot, of the Netherlands Meteorological Observatory, communicated with

Prof. Nordenskiöld, asking his opinion about the feasibility of reaching Port Dickson; and Prof. Nordenskiöld replied that there was no difficulty whatever; and so the station was accepted on the part of Holland, and the *Varna* was sent out in consequence on the 5th of July, 1882, to establish a station there.

To reach Port Dickson, which is at the mouth of the Yenisei, the Dutch expedition and the Danish expedition, in the *Dymphna*, under Lieutenant Hovgaard, commander, were fitted out to go through the Kara sea, upon the assumption that it can be passed, as Prof. Nordenskiöld stated, every year in the months of August and September; but the result of our expedition has shown, as will appear in my statement, that this assumption is unfounded.

The fishermen from Vardoe, Tromsoe, and Hammerfest go every year to the west coast of Nova Zembla for the purpose of catching seals and walruses; and if the straits of Kara or Jugor are open, they reach the Kara sea. They state that when westerly winds are prevailing, the ice cannot get through these different straits—the Jugor, the Kara, the Matotshkin Schaar—into the outer ocean, because westerly winds blow the currents into those straits, and thus keep the ice inside the Kara sea; that is, while the wind is blowing it has no outlet.

But, on the contrary, when easterly or southeasterly winds prevail, the wind drives the ice out; and my observation was that during the two months and a half before we were entirely frozen in, whenever a slight S. E. breeze set in, the ice separated and there was a movement in it, and an opening through it, to a certain extent, and that when the westerly winds sprung up everything closed up, so that an open spot was not to be found.

In the Kara bay there is a certain current, at least a current ran steadily during the time that we were there, the course of which was first easterly as far up as the mouth of the Obi, where it meets the waters of the Obi and Yenisei, which turns it again to a northwesterly direction, and it runs towards and to about the middle of the east coast of Nova Zembla, a coast that is very little known, and then it continues along the easterly coast of Nova Zembla until it meets the current coming in from the Kara straits, where it dissipates and ends. The opinion of the five members of our scientific corps was that this current was a continuation of the Gulf stream, which, entering at the Kara straits, runs through the Kara sea easterly, until it encounters the currents formed by the Obi and Yenisei, when it turns, meeting the resistance of the currents of these two rivers, and returns back along the eastern coast of Nova Zembla, until it reaches the Kara straits again, where its further course as a current ceases, and it breaks.

We left Hammerfest on the 27th of July, 1882, and reached the west coast of Nova Zembla, close to the Kara straits, about the first of August, having steered straight from Hammerfest to the Kara straits, which we found entirely blockaded up with ice; and being unable to enter the Kara sea by these straits, we attempted, up to the 30th of August, to enter by the Jugor straits, or by the Matotshkin Schaar, but were unable to enter the sea, these three straits being blocked up. We got half-way up the Matotshkin Schaar, which is very narrow, and then had to return, being unable to get any further. Finally we came back to the Kara straits, and on the 30th of August, finding it partially open, we steamed in, when we were caught by the current that I have described as a part of the Gulf Stream,

and carried into the straits at the rate of four or five miles an hour, without steam.

We were taken along by the current unwillingly, because we were satisfied that the Kara sea was blocked up with ice, and that it was getting too late in the year to erect a polar house, for we had had two or three frosts already—at about 20° to 22° Fahr.

From August 30th we were driven along Waygats and the Siberian coast until we reached lat. 64° and long. 71°—about. We could not define our exact position, because we could not get the exact horizon.

On the 8th of September a strong easterly breeze sprung up, which divided the ice, and we availed ourselves of this opportunity of getting towards the Jugor straits, with the idea of landing at Cabarocha, at the western opening of these straits. But the next day, when we were in sight of Waygats, the wind veered round to the west, the ice closed up, and we were driven back again to our old position.

On September 17th we saw smoke on the horizon, and came to the conclusion that it was the Danish expedition in the *Dymphna*. We fired up, so that they might see us, and we both managed to get together, after two days' efforts.

On September 22d both vessels got frozen in, lying about 100 yards from each other; and there we remained, in a large flake of ice.

The Danish expedition were provided with large saws, with which they sawed a pathway to a certain extent, but it proved ineffectual, for what was opened during the day with the saw was frozen up during the night.

On the 9th of October was the last that we saw of the disk of the sun; night set in thereafter.

With the polar house that we took from Drontheim, we built a cover over the ship, and in the space occupied by the polar house, in the vessel, we arranged a room for the scientific corps; but the quarters of all on board were very narrow, as the vessel was arranged merely for a passage boat, and not for wintering in the Arctic.

On December 22d we found that the ship was crushed by the pressure of the ice, the planks being twisted and sprung with the pressure, leaving openings, so that we knew that when the ice broke up the vessel would go down. Being thus forwarned, we were prepared for what did occur—the sinking of the vessel on the 30th of April. We got the flat-bottom boats out, and put flat irons underneath to use them as sledges, and we had besides, two Esquimau sledges, taking with us only ammunition, cooking utensils, a small cooking stove, coal and wood, coffee, &c. We numbered 24 persons in all; we worked our way over the water and across the ice, as far as Waygats, and on the 14th of May we were picked up by the *Obi*, a Norwegian ship, which landed us at Vardoe, from whence we found our way home.

So far as the result of the expedition is concerned, we could accomplish nothing of scientific value, for the attraction of the iron in the ship destroyed all the observations. Our instruments had been arranged for observations on land at Port Dickson, and were of no use on the ship, as they were affected by the attraction of the iron machinery and by the heat of the stoves which were essential to keep us warm.

The maps that were made for us, to observe the Northern light, to attempt to solve the explanation of that phenomenon, were of no value where we were, as means of

determining what stars the Northern light passes through, as they were made for the longitude and latitude of Port Dickson. The movements there are very rapid and sharp.

I have only to add that our life, during that time, was an exceedingly monotonous one, especially as we could not make any use of our instruments for observations, &c., and had no regular occupation.

Lieutenant Hovgaard had declared his intention of pushing further northward after we left, but his return to Vardoe proves that he did not see any chance of proceeding as far as he intended.